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STUDY PLAN FOR A COMPREHENSIVE WATER POLLUTION CONTROL PROJECT, MISSOURI-SOURIS-RED RIVER BASINS

Federal Water Pollution Control Administration
Kansas City, Missouri

January 1966

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MISSOURI - SOURIS - RED RIVER BASINS

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FOR A
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January 1966

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U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Federal Water Pollution Control Administration
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S T U D Y P L A N

FISCAL YEAR 1966

This Study Plan is prepared for specific use of the Division of Water Supply and Pollution Control, Public Health Service. The Study Plan is not to be distributed without prior approval of competent authority.

MISSOURI-SOURIS-RED RIVER BASINS COMPREHENSIVE PROJECT

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

PUBLIC HEALTH SERVICE

DIVISION OF WATER SUPPLY AND POLLUTION CONTROL

REGION VI

Revised October 1965

Revised January 1966

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MISSOURI-SOURIS-RED RIVER BASINS
COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

INTRODUCTION

This study plan represents background material required for a program review of the Missouri-Souris-Red River Basins Project. It contains information relative to budget, personnel, administrative and operational procedures likely to be encountered during the duration of the project.

Each individual activity described in this plan is an integral part of the entire project and is necessary to the Program. To assure desirable planning and efficient utilization of the resource of the project, early development of the program evaluation and review technique diagram showing the inter-relationship of each major activity and permitting the development of a critical path of program operation is essential and will be given top priority.

To the extent possible, work in the comprehensive project will be closely coordinated with the Type I Comprehensive Framework Study of the Missouri Basin Inter-Agency Committee, which is being developed using existing data.

The scheduling of work will include the development of water supply and quality control reports required by the other Federal agencies for project authorization within the boundaries of the river basins being studied. Similar reports will be prepared for areas outside the river basins, but within the states of the region, by the regional office staff.

The Federal construction agencies are involved in two types of studies, Type I, or framework study, and a Type II study. The Type I framework study covers major river basins and develops general dimensions

of water resources, water resource problems by periods of time and by broad stretch of river. The Type II study covers subbasins of the major river basins and develops data specific enough to permit site selection in the establishment of scale, of storage projects, or other structural developments. This office will make every effort to provide information to other agencies in the form and context best suited for their activities. Although the comprehensive water pollution control program cannot be put in either Type I or Type II categories.

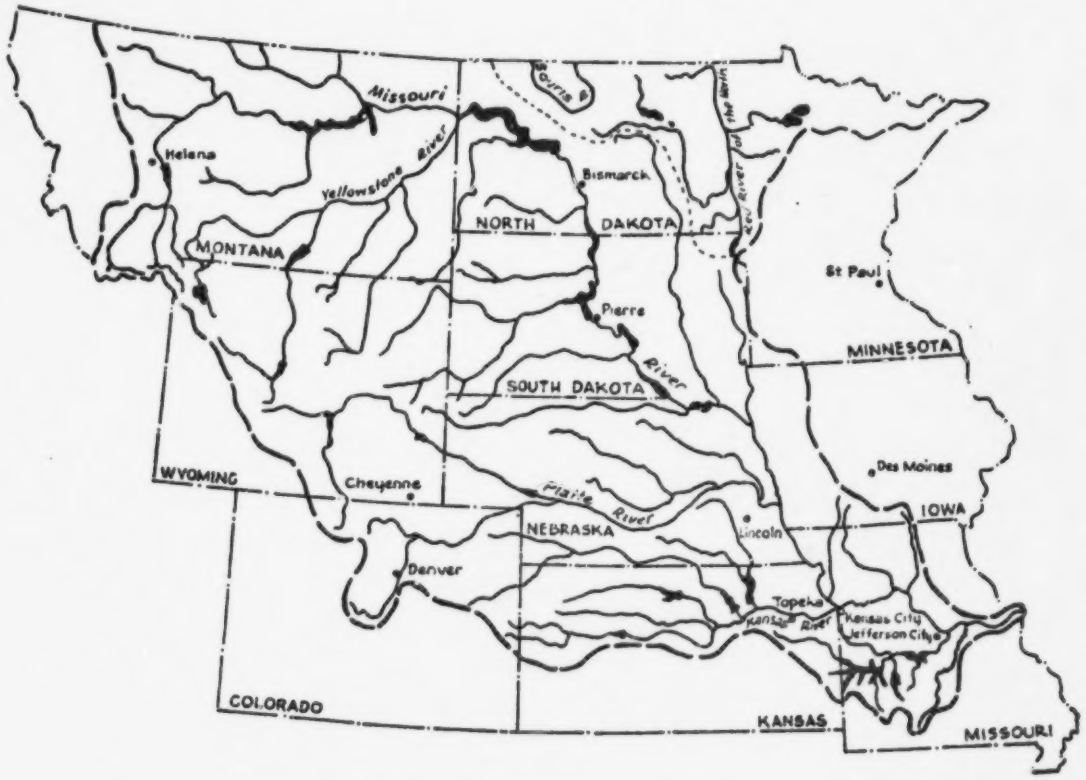
The development of comprehensive programs for water pollution control requires specific investigation, concentrating on sources of pollution, possibilities for treatment at the source, dynamic response of water systems to various types of pollution, and specialized economic projections of water use and waste water discharges. The project's objective is to develop a cooperative water quality control program for the continuing participation of the industries and private citizens as well as municipal, State and Federal agencies.

A distinction in degree or kind of investigation is not recognized in the effort to develop or establish comprehensive water pollution control programs within the meaning of Section 2 (a) of the Federal Water Pollution Control Act. The wording of the Act is as follows:

> "The Secretary shall, after careful investigation in cooperation with other Federal agencies, the State Water Pollution Control agencies, and Inter-State agencies, and with the municipalities and industries involved, prepare or develop comprehensive programs....."

The Act also authorizes the Secretary to make joint investigations with the groups mentioned. Our goal shall be to develop an effective water pollution control program in full concert with all of the

Federal, State, Inter-State, municipal and private interests of the Missouri Basin. Our active participation in Missouri Basin Inter-Agency activities and cooperation with members of the Standing Committee for Comprehensive Planning, Work Groups and Task Forces of the Missouri Basin Inter-Agency Committee and officials of other State agencies not directly represented on the Committee will be most helpful in the development of the program.



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MISSOURI-SOURIS-RED RIVER BASINS

COMPREHENSIVE PROJECT

STUDY AREA

DEPARTMENT OF HEALTH, EDUCATION & WELFARE

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

REGION VI KANSAS CITY, MISSOURI

FACT SHEET

NAME OF PROJECT: MISSOURI-SOURIS-RED RIVER BASINS COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

PROJECT LOCATION: Headquarters
601 East 12th
Kansas City, Missouri 64106
Lewis A. Young, Project Director
Charles H. Hajinian, Regional Economist
374-7000, Extension 3776

PROJECT AUTHORIZED: July 1965 Funded September 1, 1965

PROJECT BUDGET: ($1,000)

	FY 66	FY 67	FY 68	FY 69	FY 70	FY 71	FY 72
Direct (Actual)	234	740	800	800	760	620	325
Reimbursable*	23						

PROJECT POSITIONS: (Actual)

	FY 66	FY 67	FY 68	FY 69	FY 70	FY 71	FY 72
Permanent	14	35	59	59	54	45	20
Temporary	4	10	10	10	10		
Reimbursable	3						

STATES INVOLVED IN PROJECT AREA:

State	Square Miles in River Basins
Colorado	22,000
Iowa	15,000
Kansas	44,000
Minnesota	22,000
Missouri	36,000
Montana	134,000
Nebraska	76,600
North Dakota	69,500
South Dakota	76,400
Wyoming	77,500
Total Basins/Area	573,000

*For regional studies outside of project area.

RELEVANT ACTIVITIES:

Federal Water Pollution Control Administration activities in the Missouri Basin are in the following categories: (1) grants to State agencies for assistance in strengthening water pollution control programs; (2) grants to municipalities to assist in financing the cost of constructing needed sewage treatment works; (3) evaluation of the municipal and industrial water supply needs; (4) evaluation of storage requirements in water resource development projects for water quality control; (5) abatement of interstate pollution; (6) collection of basic water quality data; (7) providing technical assistance in Environmental Engineering; and (8) assisting with research in water supply and water pollution control fields, including treatment methods.

The Federal Water Pollution Control Administration programs in the Missouri Basin are administered by Regions VI and VIII with Headquarters in Kansas City, Missouri, and Denver, Colorado, respectively.

(1) State Program Grants

As authorized by Public Law 660, the Public Health Service grants to the ten Missouri Basin States are as follows:

State	Fiscal Year 1964	Fiscal Year 1965	Fiscal Year 1966
Colorado	$ 46,563	$ 45,700	$ 45,300
Iowa	72,644	69,300	67,900
Kansas	56,644	54,200	53,600
Minnesota	85,018	81,000	80,400
Missouri	99,361	94,200	93,600
Montana	25,984	24,900	24,700
Nebraska	40,373	39,600	39,400
North Dakota	27,335	24,800	24,800
South Dakota	28,166	26,500	26,300
Wyoming	18,812	17,900	17,700
Total	$ 500,900	$ 478,100	$ 473,700

Data given in all tables are for entire State.

Construction Grants to States

State	Money Available For Fiscal Year 1965	Money Available For Fiscal Year 1966
Colorado	$ 1,272,400	$ 1,563,970
Iowa	1,633,650	2,087,700
Kansas	1,466,200	1,828,500
Minnesota	1,793,100	2,359,330
Missouri	1,993,800	2,699,900
Montana	1,086,850	1,201,560
Nebraska	1,237,850	1,470,770
North Dakota	1,161,700	1,267,870
South Dakota	1,150,650	1,302,070
Wyoming	925,450	944,630
Total	$13,721,650	$16,726,300

Total grants and total project costs for participating sewage treatment works in each of the 10 Missouri Basin States through December 1965 are below:

Region VI

Total Grants and Project Costs for Treatment Works
(December 1956 through December 31, 1965)

State	No. of Projects	Est. Total Project Costs	Total Approved Eligible Costs	Grant Funds
Iowa	138	$ 55,963,443	$ 47,126,907	$ 10,901,581
Kansas	197	43,176,761	33,903,570	9,625,582
Minnesota	143	54,910,371	46,256,842	12,322,510
Missouri	186	167,998,060	142,575,530	14,727,839
Nebraska	221	47,383,501	46,240,328	8,756,871
N. Dakota	143	17,974,739	12,987,688	3,879,172
S. Dakota	105	13,746,774	11,809,545	3,816,966
Total	1,133	$ 401,153,649	$340,900,410	$ 64,030,521

Total Grants and Project Costs for Treatment Works Under Accelerated Public Works Program
(November 1962 through December 31, 1965)

State	No. of Projects	Est. Total Project Costs	Total Approved Eligible Costs	Grant Funds
		$	$	$
Kansas	3	152,042	125,167	62,582
Minnesota	22	2,483,194	2,405,351	1,179,846
Missouri	26	4,121,127	3,617,236	1,802,106
Total	51	$ 6,756,363	$ 6,147,754	$ 3,044,534

Treatment Works Combined Under WPC and APW Acts

State	No. of Projects	Est. Total Project Costs	Total Approved Eligible Costs	Grant Funds APW	Grant Funds WPC
Nebraska	8	$ 392,679*	392,679*	$88,800	$106,845

*Included in total WPC Grants

Region VIII

Total Grants and Project Costs for Treatment Works (December 1956 through December 31, 1965)

State	No. of Projects	Est. Total Project Costs	Total Approved Eligible Costs	Grant Funds
Colorado	103	$ 47,249,318	$ 42,440,219	$ 8,926,899
Montana	87	15,513,417	13,124,299	3,695,827
Wyoming	49	7,471,285	6,571,557	1,816,202
Total	239	$ 70,234,020	$ 62,136,075	$14,438,928

Federal Water Pollution Control Administration grant projects were approved during Fiscal Year 1966 for the following municipalities:

Iowa

Clinton	Olin	
Elliott	Stratford	
Madrid		

Kansas

Agra	Denison	Mayfield	St. Francis
Andover	Easton	Mission Twp(199)	St. John
Columbus	Glen Elder	Morrowville	
Coolidge	Greeley	Robinson	
	Humboldt	Rush Center	
	Iuka	Scranton	
	Jennings	Shawnee Mission Twp(I)	
	Kanopolis	Shawnee Mission Twp(T)	

Minnesota

Bertha	Hector	Maple Plain	Orr
Fairmont	Holdingford	Moorhead	Richmond
Forest Lake	Mable	New Prague	Swanville
Grand Rapids	Madelia	Northfield	Wanamingo

Missouri

Gladstone	King City	Norborne	Seneca
Hayti	Kingsville	Orrick	Scott City
Jefferson City(282)	Madison	Republic	St. Joseph(150)
Kansas City(142)	Newburg	Sedalia(270)	Urich

Nebraska

Auburn	Chambers	Hadar	Newman Grove	Silver Creek
Avoca	Dannebrog	Humboldt	Oakland	Spencer
Bee	Dunbar	Laurel	Papillion	Sutton
Bloomfield	Gering	Lyon	Ponca	Wilsonville
Boelus	Gretna	Malmo	Roca	Winside
Burwell	Grand Island	Mullen	Scribner	Valley

North Dakota

Bismarck	Grandin	Mapleton	Surrey
Beulah	Kensal	Medina	
Buxton	Mayville	Northwood	

South Dakota

Aberdeen	Clear Lake	Oldham
Alexandria	McCook	Peever
Brookings	Mission	

Colorado

Denver Metropolital Sewage Disposal District #1(COLO-112)
Eagle Sanitation District (COLO-120)
Sterling
East Canon Sanitation District(122)
Platteville
Craig
Buena Vista Sanitation District(129)
Rifle
Bear Creek Water and Sanitation District(127)

Montana

Big Sandy	Missoula
Cascade	Richland
Fairview	West Yellowstone

Wyoming

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(3) Municipal and Industrial Water Supply

Under the Federal Water Supply Act (Title III, Public Law 85-500) as amended by Public Law 87-88 provides authority for the Corps of Engineers and the Bureau of Reclamation to include storage for immediate and future water supply within Federal navigation, flood control, irrigation, or multiple purpose projects on a basis which will permit the Federal Government and local interests to share equally in the benefits of multiple purpose construction. This law also authorizes storage in Federal impoundments to regulate streamflow for the purpose of water quality control. The Public Health Service works closely with the Corps of Engineers and the Bureau of Reclamation in determining the need for and value of such storage.

(4) The following studies of needs and value of storage for municipal and industrial water supply and water quality control have been made in the Missouri Basin area:

Stream or Area	State(s)	Requested By*
Little Blue Unit (Angus Reservoir)	Nebraska	BR
Cedar Rapids Division	Nebraska	BR
Chariton & Little Chariton	Iowa-Missouri	CE
Fishing River	Missouri	CE
Grand River	Missouri	CE
Green River	North Dakota	CE
James River	N.D.-S.D.	CE
Republican River (Milford Reservoir)	Kansas	CE
Marmaton River	Kansas-Missouri	CE
Meramec River	Missouri	CE
Nemaha River Basin	Nebr.-Ks.	CE
Nelson-Buck Unit (Herndon Reservoir)	Nebr.-Ks.	BR
Delaware River (Perry Reservoir)	Kansas	CE
White River (Pine Ridge Unit)	Nebr.-S.D.	CE
Smoky Hill River (Round Mound Reservoir)	Kansas	BR
Lyon Creek (Woodbine Reservoir)	Kansas	CE
Big & Little Blue Rivers	Nebr.-Ks.	CE

Stream or Area (cont'd)	State(s)	Requested By*
Blue (Kansas City)	Missouri	CE
Little Blue (Kansas City)	Missouri	CE
Osage River	Kansas-Missouri	CE
Red River of the North	N.D.-Minnesota	CE
Elkhorn River	Nebraska	BR
Wears Creek	Missouri	CE

*CE - Corps of Engineers
BR - Bureau of Reclamation

(5) Enforcement Actions

Construction of primary waste treatment facilities in the eight enforcement areas of the Missouri River Basin is proceeding. In one of these areas (the interstate reach of the Big Blue River, Kansas-Nebraska) waste treatment facilities have been completed for Nebraska sources of pollution in accordance with the recommendations of the State Sanitary Engineer. A cooperative survey by the States of Nebraska and Kansas and the Public Health Service to determine the quality of water in this reach of the Big Blue River was made during 1964.

At the Third Session of the Conference in the matter of pollution of the interstate waters of the North Platte River, Wyoming-Nebraska, it was concluded that the rivers fisheries resources would be developed but that the States of Wyoming and Nebraska will have to decide whether water quality in the river should be improved to permit this development.

A minimum of primary treatment has been required for all sources of wastes in the Sioux City, Iowa, enforcement area. All wastes generated in this area are now receiving primary treatment with the exception of Vermillion, South Dakota. A contract has been let for the construction of a secondary waste treatment plant to serve Vermillion. The effluent will be discharged to the Vermillion River.

With the exception of Omaha, Nebraska, all wastes in the Omaha enforcement area are now receiving primary treatment. The Missouri River Sewage Treatment Plant in Omaha, Nebraska, placed in limited operation in August 1964, was designed and constructed to provide primary treatment for all industrial and domestic wastes discharged to the Omaha sewage collection system. However, the strength of industrial wastes was to have been materially reduced in accordance with the then existing Omaha City Code. Early in 1964, the State Sanitary Engineer discovered that the in-plant industrial waste reduction program was not proceeding according to the City Code and further, that the City Government of Omaha, Nebraska, had relieved the packing industry of the responsibility of providing in-plant waste reduction. In effect, the City agreed to construct an auxiliary treatment facility to receive wastes from the sewers carrying the packing industry waste and to reduce the strength of these wastes to a point compatible with design figures used by the consulting engineering firm in designing the Missouri River Sewage Treatment Plant.

The confusion and uncertainty arising from this change in planning resulted in the calling of a Second Session of the Conference in July 1964. The Conferees of the States of Iowa, Kansas, Missouri, and Nebraska and the Public Health Service unanimously, but reluctantly, agreed to accept Omaha's new plan whereby the City would finance and build another plant designed to treat packing house wastes, particularly paunch manure and grease not removed by the industries themselves. The proposed treatment facility is to be completed and in operation by December 1, 1966.

The construction of primary waste treatment facilities by the City of St. Joseph, Missouri is completed and the plan is in operation. Major intercepting sewers and other appurtenances are either completed, in the process of being constructed, or in final stages of planning. The majority of the industrial wastes generated by the industries of St. Joseph, Missouri, are located on the Missouri River immediately downstream from the City. These industries, composed primarily of packing industries, formed an industrial district for the purpose of financing and constructing a primary waste treatment facility. This industrial waste treatment plant is now in operation.

Waste treatment facilities in the Kansas Citys enforcement area are in various stages of planning, construction, and operation. Primary facilities for the City of North Kansas City, Missouri, have been completed and placed in operation. A progress evaluation was held in Kansas City, Missouri, April 21, 1965. Representatives of the state water pollution agencies and the Public Health Service reaffirmed the previously agreed-upon completion date of early 1967.

The Metropolitan St. Louis Sewer District has completed and placed in operation a secondary waste treatment plant which receives all wastes in the District area which discharge to the Missouri River.

(6) Water Quality

The Water Pollution Surveillance System was established by the Public Health Service in 1957 for the purpose of obtaining data on the radiological, biological, chemical and physical qualities of the major surface waters.

There are presently 130 Water Pollution Surveillance System sampling stations located throughout the United States, with 15 of these stations located in the Missouri Basin Inter-Agency Committee area as follows:

River	Station
Missouri River	St. Louis, Missouri
Missouri River	Missouri City, Missouri
Missouri River	Kansas City, Kansas
Missouri River	St. Joseph, Missouri
Missouri River	Omaha, Nebraska
Missouri River	Yankton, South Dakota
Missouri River	Bismarck, North Dakota
Missouri River	Williston, North Dakota
Red River (North)	Grand Forks, North Dakota
Big Sioux River	Below Sioux Falls, South Dakota
Platte River	Above Plattsmouth, Nebraska
North Platte River	Above Henry, Nebraska
South Platte River	Julesburg, Colorado
Yellowstone River	Livingston, Montana
Kansas River	Near DeSoto, Kansas

Since 1957 and through 1962, the expansion of the Water Pollution Surveillance System was at an average rate of 30-40 new stations each year. It is expected that the System will be expanded as funds become available for adding more stations. There is an urgent need to expand the System as comprehensive water quality projects are developed.

During Fiscal Year 1964, the Public Health Service distributed printed copies of its "Municipal Water Facilities Inventory - 1962." Field data for up-dating the "Municipal Water Facilities Inventory in Communities of 25,000 Population and Over" have been assembled and this revised inventory will soon be ready for distribution by the Public Health Service.

(7) Technical Assistance in Environmental Engineering

Technical assistance to State and Federal agencies on problems

of water quality is authorized by the Federal Water Pollution Control Act. Continuing studies are in progress in such fields as quality control of potable water supplies, reevaluation of drinking water standards, the effects of impoundments on downstream water quality, and conservation and improvement of water quality. Problems of toxicity from insecticides, herbicides and other chemicals reaching water supplies through sewage or industrial waste and surface wash are also problems being investigated by the Public Health Service.

(8) Research in Water Supply and Pollution Control Fields

At present, most of the research activities in the water supply and pollution control fields are carried out at the Sanitary Engineering Center located in Cincinnati, Ohio. Twelve Field Laboratories are planned or under construction, including one at Columbia, Missouri, which will serve the Missouri Basin area. The basic function of these field laboratories is to provide resources for conducting those activities in research and development, technical operations and training which require field laboratory services for effective operation. These laboratories will represent technical service arm of the Federal Water Pollution Control Administration in various areas of the nation. Each will be assigned to specific areas of research involving similar skills and equipment, based on problem areas appropriate to regions concerned.

At the Missouri Basin Laboratory, emphasis will be placed on waste treatment, water quality control, reduction of nutrients in treated waste, and control of pollution from agricultural activities. The Laboratory program will supplement the work of the Missouri-Souris-Red River Basins Comprehensive Water Pollution Control Project.

Until the Missouri Basin Laboratory is in operation, such services will be provided by the Sanitary Engineering Center at Cincinnati, Ohio. In Fiscal Year 1966, research is continuing in the exploring of new methods of waste treatment and methods of itemizing and evaluation of effects of chemical pollution.

The Water Pollution Surveillance System of the national network of sampling stations has headquarters in Cincinnati. The Water Pollution Surveillance System laboratory is equipped to make complex examinations to determine minute concentrations of unusual pollutants in samples forwarded from the network surveillance stations. The results of the analysis made in the Cincinnati Laboratory, as well as those made locally at the time a sample collection is taken, are made available to all participants engaged in operation and maintenance in a network on a quarterly basis. Particularly significant results are made available immediately.

A compilation of all data is published annually, five volumes being previously published with a sixth printing covering water years October 1, 1962 to September 30, 1963, in the process of printing. These 62-63 data are being published in sets of 11 volumes with each volume pertaining to a major river basin.

IMPETUS FOR START OF PROJECT:

The Missouri Basin Inter-Agency Committee adopted at its June, 1964 meeting an outline of work for a comprehensive framework study for the Missouri Basin. A standing committee was established to carry on the coordination of the work of the Federal agencies and States in accomplishing a Type I Comprehensive Framework Study of Water and Related Land Resources Development of the Missouri Basin. A copy of the work outline and of the coordinated budget estimates for the Federal agencies is attached to this report.

The chairman of the Standing Committee for Comprehensive Planning in transmitting the coordinated budgets pointed out that a delay of the intensive phase of the Department of Health, Education, and Welfare program would adversely affect development of the study and stated the Public Health Service Missouri River Comprehensive Study requires immediate funding by direct appropriation and authority for staffing so that the Public Health Service can timely provide water supply and water quality data to other cooperating agencies.

The development of comprehensive programs for water pollution control, however, requires specific investigations concentrating on sources of pollution, possibilities for treatment at the source, dynamic response of water systems to various types of pollution, and even specialized economic projections of water use and waste water discharges. Such programs cannot be put in either Type I or Type II categories. In order to develop an effective water pollution control program, in full concert with all of the Federal, State, Inter-State and private interests in the Missouri Basin requires immediate

authorization of the Missouri-Souris-Red Rivers Basins Comprehensive Programs with adequate funding and authorization for staffing.

Recent Population Census

The Missouri River Basin contains a total of 425 counties, counting Yellowstone National Park as one. The Red River of the North embraces 36 counties which makes an overall total of 461 counties. Summary of Population data for 1950 and 1960 are shown below.

Summary of Population by Region

Missouri River Basin and Red River of the North

1950 - 1960

	Missouri River Basin	Souris and Red River of the North
1950 Population		
Total	7,063,441	581,692
Urban	3,473,088	157,828
Rural	3,590,353	423,864
1960 Population		
Total	7,931,103	573,321
Urban	4,555,954	192,572
Rural	3,375,149	380,749

Although the Missouri River Basin comprises about one-sixth of the area of the conterminous United States, the basin's population in 1960 represented less than five percent of the national total. From 1950 to 1960, the national population increased 18.4 percent, while the population in the Missouri River Basin increased 12.3 percent.

The predominant rural character and declining farm population has

been largely responsible for the basin's decreasing relative position. Comparative changes in rural population from 1950-1960 show a basin decline of 6.0 percent compared to a national decline of less than 1.0 percent.

The urban population growth in the basin has been slightly larger than urban gains nationally. Actually, the percentage increases in the basin's urban population from 1950-1960 was 31.2 percent, while nationally the urban increase was 29.3 percent. The table below depicts a comparison of population in the Missouri River Basin and in the conterminous United States.

In 1960, the basin had almost 2 million persons residing in the rural nonfarm sector (places of less than 2,500 inhabitants, and not living on farms). This rural nonfarm population has shown a 16 percent increase from 1950 to 1960, indicating some industrialization in these areas.

Comparison of Population in the Missouri River Basin and in the Conterminous United States
1950 - 1960
(Thousands)

	Conterminous United States		Missouri River Basin		Missouri River Basin's Percent of United States
	Number	Percent	Number	Percent	
1950					
Total	150,698	100.0	7,063	100.0	4.7
Urban	96,468	64.0	3,473	49.2	3.6
Rural	54,230	36.0	3,590	50.8	6.6
1960					
Total	178,464	100.0	7,931	100.0	4.4
Urban	124,699	69.9	4,556	57.4	3.7
Rural	53,765	30.1	3,375	42.6	6.3
Percent Change 1950-1960					
Total Population	+18.4		+12.3		
Urban	+29.3		+31.2		
Rural	- 0.9		- 6.0		

Summary of Population in Standard Metropolitan Statistical Areas
Missouri River Basin and Red River of the North
1950, and 1960

SMSA	Subbasin 1/	1950	1960	Change
Missouri				
Great Falls, Montana	Upper Missouri	53,027	73,418	+38.5
Billings, Montana	Yellowstone	55,875	79,016	+41.4
Sioux Falls, So. Dakota	Eastern Tribs.	70,910	86,575	+22.1
Denver, Colorado	Platte	612,128	929,383	+51.8
Lincoln, Nebraska	Sioux C. Kansas C.	119,742	155,272	+29.7
Omaha, Nebraska	Sioux C. Kansas C.	366,395	457,873	+25.0
Sioux City, Iowa	Sioux C. Kansas C.	114,318	120,017	+ 5.0
St. Joseph, Missouri	Sioux C. Kansas C.	96,826	90,581	- 6.4
Kansas City, Missouri	Lower Mo. Trib.	848,655	1,092,545	+28.7
Topeka, Kansas	Kansas	105,418	141,286	+34.0
Springfield, Missouri	Lower Mo. Trib.	104,823	126,276	+20.5
Missouri Basin total eleven SMSA's		2,548,117	3,352,242	+31.6
Red River of the North				
Fargo-Moorhead, No. Dakota		89,240	106,027	+18.8

1/ Subbasins established by Missouri Basin Inter-Agency Committee for the Missouri River Basin

Population of Urban Places
Missouri River Basin
1950 and 1960

Region	City	State	County	1950	1960	Change
			25,000 to 50,000 in 1960			
Western Tribs.	Rapid City	So.Dakota	Pennington	25,310	42,399	+67.5
Eastern Tribs.	Bismarck	No.Dakota	Burleigh	18,640	27,670	+48.4
Platte	Casper	Wyoming	Natrona	23,673	38,930	+64.4
Platte	Ft.Collins	Colorado	Larimer	14,937	25,027	+67.6
Platte	Greeley	Colorado	Weld	20,354	26,314	+29.3
Platte	Cheyenne	Wyoming	Laramie	31,935	43,505	+36.2
Platte	Grand Island	Nebraska	Hall	22,682	25,742	+13.5
Kansas	Lawrence	Kansas	Douglass	23,351	32,858	+40.7
Kansas	Salina	Kansas	Saline	26,176	43,202	+65.0
Lower Mo. Tr.	Columbia	Missouri	Boone	31,974	36,650	+14.6
Lower Mo. Tr.	Jefferson City	Missouri	Cole	25,099	28,228	+12.5
Total				264,131	370,525	+40.3

Population of Urban Places
Missouri River Basin
1950 and 1960

Region	City	State	County	1950	1960	Change
			10,000 to 25,000 in 1960			
Upper Mo.	Helena	Montana	Lewis & Clark	17,581	20,227	+15.0
Upper Mo.	Bozeman	Montana	Gallatin	11,325	13,361	+18.0
Upper Mo.	Havre	Montana	Hill	8,086	10,740	+32.8
Yellowstone	Sheridan	Wyoming	Sheridan	11,500	11,651	+ 1.3
Western Tribs.	Mandan	No. Dakota	Morton	7,298	10,525	+44.2
Eastern Tribs.	Jamestown	No. Dakota	Stutsman	10,697	15,163	+41.8
Eastern Tribs.	Williston	No. Dakota	Williams	7,378	11,866	+60.8
Eastern Tribs.	Huron	So. Dakota	Beadle	12,788	14,180	+10.9
Eastern Tribs.	Aberdeen	So. Dakota	Brown	21,051	23,073	+ 9.6
Eastern Tribs.	Mitchell	So. Dakota	Davison	12,123	12,555	+ 3.6
Eastern Tribs.	Pierre	So. Dakota	Hughes	5,715	10,088	+76.5
Eastern Tribs.	Brookings	So. Dakota	Brookings	7,764	10,558	+36.0
Eastern Tribs.	Watertown	So. Dakota	Codington	12,699	14,077	+10.9
Platte	Laramie	Wyoming	Albany	15,581	17,520	+12.4
Platte	Sterling	Colorado	Logan	7,534	10,751	+42.7
Platte	Kearney	Nebraska	Buffalo	12,115	14,210	+17.3
Platte	No. Platte	Nebraska	Lincoln	15,433	17,184	+11.3
Platte	Scotts Bluff	Nebraska	Scotts Bluff	12,858	13,377	+ 4.0
Platte	Columbus	Nebraska	Platte	8,884	12,476	+40.4
Sioux C.) Kansas C.)	Atchison	Kansas	Atchison	12,792	12,529	- 2.1
Sioux C.) Kansas C.)	Fremont	Nebraska	Dodge	14,762	19,698	+33.4
Sioux C.) Kansas C.)	Norfolk	Nebraska	Madison	11,335	13,640	+20.3
Kansas	Hayes	Kansas	Ellis	8,625	11,947	+38.5
Kansas	Hastings	Nebraska	Adams	20,211	21,412	+ 5.9
Kansas	Beatrice	Nebraska	Gage	11,813	12,132	+ 2.7
Kansas	Junction City	Kansas	Geary	13,462	18,700	+38.9
Kansas	Leavenworth	Kansas	Leavenworth	20,579	22,052	+ 7.2
Kansas	Manhattan	Kansas	Riley	19,056	22,993	+20.7
Lower Mo. Tr.	Kirksville	Missouri	Adair	11,110	13,123	+18.1
Lower Mo. Tr.	Moberly	Missouri	Randolph	13,115	13,170	+ 0.4
Lower Mo. Tr.	Fulton	Missouri	Callaway	10,052	11,131	+10.7
Lower Mo. Tr.	Sedalia	Missouri	Pettis	20,354	23,874	+17.3
Lower Mo. Tr.	Ottawa	Kansas	Franklin	10,081	10,673	+ 5.9
Lower Mo. Tr.	Rolla	Missouri	Phelps	9,354	11,132	+19.0
Total				425,111	501,788	+18.0

Population of Urban Places
Missouri River Basin
1950 and 1960

Region	City	State	County	1950	1960	Change
		10,000 to 25,000 in 1960				
Upper Mo.	Helena	Montana	Lewis & Clark	17,581	20,227	+15.0
Upper Mo.	Bozeman	Montana	Gallatin	11,325	13,361	+18.0
Upper Mo.	Havre	Montana	Hill	8,086	10,740	+32.8
Yellowstone	Sheridan	Wyoming	Sheridan	11,500	11,651	+ 1.3
Western Tribs.	Mandan	No. Dakota	Morton	7,298	10,525	+44.2
Eastern Tribs.	Jamestown	No. Dakota	Stutsman	10,697	15,163	+41.8
Eastern Tribs.	Williston	No. Dakota	Williams	7,378	11,866	+60.8
Eastern Tribs.	Huron	So. Dakota	Beadle	12,788	14,180	+10.9
Eastern Tribs.	Aberdeen	So. Dakota	Brown	21,051	23,073	+ 9.6
Eastern Tribs.	Mitchell	So. Dakota	Davison	12,123	12,555	+ 3.6
Eastern Tribs.	Pierre	So. Dakota	Hughes	5,715	10,088	+76.5
Eastern Tribs.	Brookings	So. Dakota	Brookings	7,764	10,558	+36.0
Eastern Tribs.	Watertown	So. Dakota	Codington	12,699	14,077	+10.9
Platte	Laramie	Wyoming	Albany	15,581	17,520	+12.4
Platte	Sterling	Colorado	Logan	7,534	10,751	+42.7
Platte	Kearney	Nebraska	Buffalo	12,115	14,210	+17.3
Platte	No. Platte	Nebraska	Lincoln	15,433	17,184	+11.3
Platte	Scotts Bluff	Nebraska	Scotts Bluff	12,858	13,377	+ 4.0
Platte	Columbus	Nebraska	Platte	8,884	12,476	+40.4
Sioux C.) Kansas C.)	Atchison	Kansas	Atchison	12,792	12,529	- 2.1
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Lower Mo. Tr.	Fulton	Missouri	Callaway	10,052	11,131	+10.7
Lower Mo. Tr.	Sedalia	Missouri	Pettis	20,354	23,874	+17.3
Lower Mo. Tr.	Ottawa	Kansas	Franklin	10,081	10,673	+ 5.9
Lower Mo. Tr.	Rolla	Missouri	Phelps	9,354	11,132	+19.0
Total				425,111	501,788	+18.0

MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT

Mainstream and Major Tributaries

Name of River	Where River Rises	Length of River in Miles
Missouri	Montana	2464
Gallatin	Montana	120
Jefferson	Montana	207
Madison	Montana	183
Sun	Montana	126
Milk	Montana	687
Yellowstone	Wyoming	671
Powder	Wyoming	486
Tongue	Wyoming	265
Big Horn	Wyoming	336
Little Missouri	Montana	560
Cannonball	North Dakota	295
Grand	South Dakota	329
Moreau	South Dakota	373
Cheyenne	South Dakota	340
Belle Fourche	Wyoming	316
White	Nebraska	507
James	North Dakota	710
Platte	Nebraska	310
Elkhorn	Nebraska	333
South Platte	Colorado	442
North Platte	Wyoming	680
Kansas	Kansas	175
Republican	Colorado	544
Smoky Hill	Colorado	562
Big Blue	Nebraska	287
Grand	Iowa	217
Osage	Kansas	496
Platte	Iowa	253
Chariton	Iowa	280
Gasconade	Missouri	270
Red River of the North	Minnesota South Dakota	394
Souris	Canada	360

WATER POLLUTION SURVEILLANCE SYSTEM STATIONS IN THE MISSOURI-SOURIS-RED RIVER BASINS

Station No.	State	River	Location
104	Montana	Big Horn	at Hardin
80	South Dakota	Big Sioux	below Sioux Falls
128	Kansas	Kansas	at De Soto
28	Missouri	Missouri	at St. Louis
108	Missouri	Missouri	at Missouri City
29	Kansas	Missouri	at Kansas City
30	Missouri	Missouri	at St. Joseph
31	Nebraska	Missouri	at Omaha
32	South Dakota	Missouri	at Yankton
33	North Dakota	Missouri	at Bismarck
34	North Dakota	Missouri	at Williston
94	Nebraska	North Platte	above Henry
86	Nebraska	Platte	above Plattsmouth
92	Colorado	South Platte	at Julesburg
55	Montana	Yellowstone	near Sidney
69	North Dakota	Red River of North	at Grand Forks

GAGING STATIONS WHICH ARE SENDING IN STREAMFLOW DATA FOR EACH OF THE WATER POLLUTION SURVEILLANCE SYSTEM STATIONS

WPSS Station	Gaging Station Location
Bismarck, North Dakota (33)	Bismarck, North Dakota
Grand Forks, North Dakota (69)	Grand Forks, North Dakota
Williston, North Dakota (34)	Williston, North Dakota
Henry, Nebraska (94)	Wyoming-Nebraska State Line
Missouri City, Missouri (108)	Boonville, Missouri
St. Louis, Missouri (28)	Hermann, Missouri
Omaha, Nebraska (31)	Omaha, Nebraska
Plattsmouth, Nebraska (86)	South Bend, Nebraska
Sioux Falls, South Dakota (80)	Brandon, South Dakota
Yankton, South Dakota (32)	Yankton, South Dakota
De Soto, Kansas (128)	Bonner Springs, Kansas
Coolidge, Kansas (2)	Coolidge, Kansas
Kansas City, Kansas (29)	Kansas City, Missouri
St. Joseph, Missouri (30)	St. Joseph, Missouri

WATER POLLUTION SURVEILLANCE SYSTEM STATIONS ADJACENT TO MISSOURI RIVER BASIN

Station No.	State	River	Location
113	Idaho	Pend Orielle	at Albeni Falls Dam
114	Idaho	Spokane	at Post Falls Dam
97	Idaho	Clearwater	at Lewiston
125	Idaho	Bear	above Preston
121	Utah	Green	at Dutch John
6	Colorado	Colorado	at Loma
72	Colorado	Rio Grande	below Alamosa
2	Kansas	Arkansas	at Coolidge
1	Oklahoma	Arkansas	near Ponca City
109	Oklahoma	Verdigris	at Nowata
23	Missouri	Mississippi	at Cape Girardeau
24	Illinois	Mississippi	at East St. Louis
98	Illinois	Illinois	near Grafton
67	Illinois	Illinois	at Peoria
25	Iowa	Mississippi	at Burlington
26	Iowa	Mississippi	at Dubuque
27	Minnesota	Mississippi	below St. Paul
16	Minnesota	Lake Superior	at Duluth
101	Minnesota	Rainy	at International Falls
96	Minnesota	Rainy	at Baudette

FISH KILLS IN REGION VI DURING CALENDAR YEAR 1964

MONTH STATE	NUMBER OF FISH KILLS	TOTAL KILLED	CAUSE OF FISH KILLS REPORTED BY STATE FISH AND GAME AGENCIES
JANUARY			
Missouri	3	7,200	Sewage Plant Overload, Raw Sewage, Silt Waste
FEBRUARY			
Iowa	1	10,000	Gasoline
Minnesota	2	2,000	Industrial Waste, Unknown
Missouri	1	10,000	Sewage Plant Overload
MARCH			
Minnesota	1	100	Unknown
Missouri	3	7,000	Sewage Plant Overload, Unknown
APRIL			
Iowa	1	6,000	Ammonia-Nitrogen
MAY			
Iowa	2	2,500	Industrial Waste, Raw Sewage
Missouri	14	314,900	Pesticides, Industrial Waste, Unknown
Nebraska	7	16,900	Rain, Fertilizer, Water removed for irrigation, Pesticides, Feedlot run off
JUNE			
Iowa	6	20,700	Industrial Waste, Sewage Plant Overload, Unknown
Missouri	5	45,200	Pesticides, Feedlot Run off, Unknown
JULY			
Iowa	1	1,000	Heat
Missouri	4	32,300	Pesticides, Feedlot Run off, Raw Sewage
Nebraska	2	7,900	Pesticides, Heat
AUGUST			
Iowa	2	47,400	Sewage Plant Overload, Low Water
Missouri	4	20,000	Industrial Waste, Pesticides, Sewage Plant Overload, Low Water
Nebraska	2	39,000	Disease, Unkown
SEPTEMBER			
Iowa	2	5,300	Pesticide, diesel fuel
Missouri	1	300	Pipeline break

ENFORCEMENT ACTION IN THE MISSOURI-SOURIS-RED RIVER BASINS UNDER THE PROVISIONS OF THE FEDERAL WATER POLLUTION CONTROL ACT

Beatrice, Nebraska - Big Blue River (Nebraska-Kansas)
- Conference
  - One session - Beatrice, Nebraska - 5/3/57

Scottsbluff, Nebraska - North Platte River (Nebraska-Wyoming)
- Conference
  - 1st session - Scottsbluff, Nebraska - 9/12/61
  - 2nd session - Cheyenne, Wyoming - 3/21/62
  - 3rd session - Scottsbluff, Nebraska - 11/20/63

Sioux City, Iowa - Missouri River (South Dakota-Nebraska-Iowa)
- Conference
  - One session - Sioux City, Iowa - 7/24/58
- Hearing - Sioux City, Iowa - 3/23-27/59

Omaha, Nebraska - Missouri River (Nebraska-Iowa-Kansas-Missouri)
- Conference
  - 1st session - Omaha, Nebraska - 6/14/57
  - 2nd session - Omaha, Nebraska - 7/21/64
- Program Evaluation - Omaha, Nebraska - 2/11-12/65

St. Joseph, Missouri - Missouri River (Kansas-Missouri)
- Conference
  - One session - St. Joseph, Missouri - 6/11/57
- Hearing - St. Joseph, Missouri - 7/27-30/59
- (Was referred to Department of Justice 8/1/60)

Kansas Citys Area - Missouri River (Kansas-Missouri)
- Conference
  - One session - Kansas City, Missouri - 12/3/57
- Hearing - Kansas City, Missouri - 6/13-17/60
- Program Evaluation - Kansas City, Missouri - 4/21/65

St. Louis Metropolitan Area - Missouri & Mississippi Rivers (Missouri-Illinois)
- Conference
  - One session - St. Louis, Missouri - 3/4/58

Fargo, North Dakota - Red River of the North (Minnesota-North Dakota)
- Conference
  - One session - Fargo, North Dakota - 9/14/65

SURVEYS AND STUDIES

A stream survey ran in mid-July 1964 on the Big Blue River area was made to determine if pollution abatement facilities were adequate.

An inspection of packing plants in Omaha, Nebraska, was made during November 1964.

An intra-state enforcement study is being made on the South Platte River at the request of the Governor of Colorado.

PROGRAM PLANNING FOR
MISSOURI-SOURIS-RED RIVER BASINS COMPREHENSIVE PROJECT
FISCAL YEAR 1966

OBJECTIVES:

The objectives of the Public Health Service's study is to develop an effective comprehensive water quality and pollution control program cooperatively with all the Federal, State, Interstate and private interests in the Missouri Basin. Comprehensive water pollution control planning is directed toward the development of a long range program designed to provide a regulated supply of clean water readily available to the present and future population of a given geographic area for all their legitimate uses. The major elements involved in each study include the forecasting of economic growth, computation of streamflow and removal requirements for reducing pollutants concentrations, and development of technical administrative means for operating the river system to insure optimum water quality and pollution control. Concurrently, the project staff will work with and supply the data needed for the development of the Comprehensive Framework Plan of the Missouri Basin Inter-Agency Committee.

PROBLEM SIGNIFICANCE:

The streams and aquifers of the Missouri-Souris-Red River of the North Basins are important sources of water, serving all phases of the area's economy, providing for such needs as water supply, navigation, irrigation, recreation, removal of wastes, etc. Multi-purpose use and reuse has resulted in a number of major water quality problems. Increasing demands will require additional reuse of the waters.

The utilization of the waterways for disposal of wastes has

created localized pollution problems, with dissolved oxygen deficits, and bacterial build-ups. A large majority of the municipalities in the basin have treatment works in operation or under construction, but many of the plants are overloaded. Below most of the larger towns and in many other reaches, the quality of the water in the receiving stream has deteriorated. In some instances, fish kills have resulted.

Treated wastes discharged and surface runoff from agricultural lands have increased the algal nutrients in the streams. Impoundments have reduced the natural turbidity. The combination of these two has resulted in algal blooms creating complex taste and odor problems in municipal water supplies. This is a recurring problem, especially on the lower Missouri River.

Agriculture is a major occupation. Pesticides, herbicides, and associated agricultural wastes carried by stream runoff and return irrigation flows are degrading stream quality. Salts leached from soils or flushed from irrigated areas in Kansas and the Dakotas have increased the total dissolved solids far in excess of desirable concentrations.

More than 1,000 food processing plants are operating in the study area. They freeze, can, grind, package and otherwise process meat, dairy products, fruit, vegetables, potatoes, sugar beets, grain and other products. The handling of such wastes in the northern part of the study area is further complicated by the severe weather conditions during the winter.

The overall problem to be resolved through careful examination of present physical makeup of the waterways, together with forecasts as to probable future changes, is that of providing a water quality

which will meet local use requirements in such a manner as to permit a continued high level of public health, economic and recreational opportunities throughout the Missouri-Souris-Red River of the North Basins.

The primary impetus for starting the project at this time is the present concern of the State and local agencies regarding existing pollution problems.

BRIEF DESCRIPTION OF BASIN:

The Missouri River, the longest river in the United States, flows 2,464 miles from Three Forks, Montana to its mouth. The river joins the Mississippi a few miles above St. Louis, Missouri. The river system drains an area of 529,000 square miles of the United States and Canada of which about 9,700 square miles lie north of the international boundary. The area in the United States is about one-sixth the total area of the nation and includes parts of all of ten states. By far the greater part of the area is comprised of rolling or gently sloping plains and prairies, bordered on the west by the Rocky Mountains with the Ozark Highlands to the south. Within the plains area, the Black Hills of South Dakota are a principle topographic feature. The Red River of the North and its tributaries flow into Canada. This river system drains approximately 44,000 square miles of the United States.

The Missouri River, with its tributaries, rises to elevations of 14,000 feet and empties into the Mississippi River at elevation of 400 feet. The maximum, average, and minimum flows at the mouth are about 900,000, 83,000, and 4,000 cubic feet per second, respectively. The Missouri River has 30 major tributaries, varying in length from

100 to 1,000 miles, and draining areas varying in size from 2,400 square miles to 90,000 square miles.

The area has widely divergent climatic characteristics. Average annual rainfall ranges from about 6 inches for a limited area in the northwestern plains to 44 inches in the lower basin. Seasonal rainfall over most of the basin is highly variable, and the annual rainfall can vary from less than one-half normal to several times the normal rainfall. There is also a wide range in temperatures, from -60° to 120° F, with below zero to over 100 degrees being experienced over much of the basin.

The basin has approximately 113 million acres in cropland, 175 million in grassland, 45 million in forest and woodland, and 7 million acres in other uses, totaling 340 million acres. Nearly two-thirds of the western plains is in grass, while in the lower basin and eastern plains nearly one-half of the land is used for crops. Forests and woodlands are important in the Rocky Mountains, Black Hills, and Ozark Highlands. About 4½ million acres, or 1½ percent of the farmlands are irrigated, 7 percent of the approximately 550,000 farms report some irrigation. The basin contains approximately 25 percent of the farmland of the nation. It produces more than one-third of the nation's wheat and sugar beets, nearly one-half of the rye and flaxseed, and includes between one-fourth and one-third of the nation's acreage of corn, oats and barley. Sales of livestock and wool amount to over one-fourth of the nation's total.

Agricultural enterprises, including processing of agricultural products, are the principal business and provide jobs for about one-third of the employed persons within the region. A major economic

contribution in several basin states is made by business in connection with tourists attracted by the recreation and wildlife resources.

In 1962, the ten Basin States produced 47 different mineral commodities valued at $2,371 millions which is indicative of current development and the potential. Total population (1960) is about 7½ million, of which more than three-fifths live in urban areas. Population density is much higher in the eastern portion with most of the large cities located along the major streams. The farm population varies from over ten people per square mile in the eastern portion of the basin to less than two per square mile in the northwestern half of the basin. In recent years there has been a trend of people moving from rural to urban areas. On an overall basis, the population of the basin has not kept up with the national rate of increase, indicating emigration of the basin's residents. This has caused concern because indications are that it is the younger generation which is leaving.

LONG RANGE GOALS:

The long range goals of the Missouri-Souris-Red River Basins Comprehensive Program are:

1. The development of long range goals designed to provide a regulated supply of clean water available for all legitimate uses to the present and future population of given geographic areas. The development of the goals to be accomplished by consultation and cooperation with officials and leaders in the project area and by economic studies and projections to determine the probable and

desirable uses of specific portions of streams and other waters during a fifty year period covered by the study. The program must be a cooperative effort of local, State, and Federal agencies.

2. To seek out those areas where water pollution now or may, during the fifty year study period, interfere with projected beneficial uses.

3. To determine and evaluate alternate means to reduce the effects of pollution below the threshold of interference with reasonable use.

4. To stimulate local, State, and Federal initiative to implement water pollution control through suitable legislation, adequate financing, and active regulatory control.

5. To keep the developed water pollution control plan current by readily retrievable data, by constant updating and by continuous surveillance.

The plan of attack to achieve the above listed goals is:

1. A reconnaissance of the stream systems will be used to determine all areas which are presently exposed to excessive organic, inorganic, or toxic wastes, and pinpoint areas requiring intensive study.

2. Through economic base studies and projections and engineering reconnaissance determine the location and magnitude of probable critical pollution loads to be expected during the fifty year study period.

3. In cooperation with the Standing Committee for

Comprehensive Planning of the Missouri Basin Inter-Agency Committee, Federal, State, and local agencies and other interested groups in the study area determine the probable effect of present and future man-made structures, such as storage, drainage, diversion, channeling, etc., on the water resources.

4. Install the STORET System of Water Quality Data Storage and Retrieval to facilitate the use and analysis of available data and data which will be obtained during the study.

5. Determine the assimilating capacity of critical reaches of streams and any other bodies of water during critical periods of time, analyzing conditions of low flow and high temperature periods for organic loadings and high flow and low temperature conditions for maximum bacteriological effects.

6. Project previously determined stream and pollution load characteristics to anticipate a condition of maximum loading and minimum assimilating capacity.

7. For selected critical areas, determine alternatives including cost, benefits and liabilities by which water of adequate quality to permit desired uses can be assured, working cooperatively with the Missouri Basin Inter-Agency Committee for Comprehensive Planning in the evaluation of such alternatives.

8. Develop a continuing program in cooperation with

local, State, and Federal agencies and industrial interests to assure that the developed program is kept current with changing conditions, responsive to changing needs, and alert to abate the degrading of water quality.

9. Prepare a report summarizing actions taken, data accumulated, conclusions reached and recommendations.

In the development of the program, all beneficial water uses will be considered with particular emphasis in regard to conflicts for a limited resource.

To implement the plan of attack, one of the first orders of business will be the development of a PERT diagram for scheduling of all activities.

Early installation of the STORET System is planned which will require the development of river mileage code and the assembling of all available data. This method of storage and retrieval of water quality data has been discussed with some of the States of the area who have expressed an interest and have indicated they would be willing to cooperate with us in the development of the system. Several of the States have considerable quantities of data which could be stored. We will need a uniform scale complete set of Basin maps for river mile coding. Additional detailed maps for some of the highly developed areas would be desirable if such are available.

Members of the staff of the Regional Office, Water Resources Section, have been given key positions in the Work Groups of the Standing Committee for Comprehensive Planning of the Missouri Basin Inter-Agency Committee. Staff members have been assigned as chairmen of Work Groups or Task Forces relating to field of water supply,

water quality, and water quality control. A staff member is chairman of Work Group V which is assigned the responsibilities of developing working papers for each of the nine regions of the Basin. These working papers are the documents which will be used in developing the Type I Framework Comprehensive Plan. The scheduling of the development of these working papers is shown in the Comprehensive Basin Planning tentative schedule developed by the Standing Committee on Comprehensive Planning of the Missouri Basin Inter-Agency Committee. The development of these working papers will be a cooperative effort of representatives from seven Federal agencies and ten Missouri River Basin States.

The Office of Business Economics of the Department of Commerce is developing economic projections for the nine regions of the Missouri Basin. Using these basic data, an economic study will be developed for the entire area.

While awaiting preliminary economic and demographic data and projections from the Department of Commerce (Office of Business Economics) the Economic Work Group of the Missouri Basin Inter-Agency Committee has assigned a number of duties in regard to an Economic Base Study. We have accepted assignments regarding population, labor forces, and industrial organization, including location factors pertinent to economic and population projections. Our limited staff has prevented us in carrying out our responsibilities in an adequate manner. These data will be useful for the Missouri-Souris-Red River Basins Comprehensive project.

CONSULTANTS:

There are a number of Federal, State and privately employed

individuals who are well informed as to the basin and its water resource problem who can be drawn upon as consultants for the project. These professional men have had a great number of years of experience in water resource development. In addition, it is anticipated that other consultants will be invited to meet with the project staff to aid in the formulation of mathematical models, computer programs, etc., when the project is at a more advanced stage.

COMMITTEES:

Groups such as the Missouri Basin Engineering Health Council and the Missouri River Basin Inter-Agency Committee will be asked to designate representatives to serve as advisory committees to the study. The adequacy of these groups in supplying necessary support to the project will be evaluated. Representatives of water users and Federal, State, Interstate , and local agencies, interested groups industries that can be cultivated to provide public support for the program will be invited to serve on committees. These committees may be assigned tasks by regions, or by subject. Contacts have been made and assurrances have been received of cooperation and assistance when needed.

ACCOMPLISHMENTS THROUGH JANUARY 1, 1965:

The Water Resources Staff of the Kansas City, Missouri Regional Office has actively participated in the work of the Standing Committee on Comprehensive Basin Planning of the Missouri Basin Inter-Agency Committee. A staff member serves both on the Standing Committee and is a member of the Committee's Executive Group. In addition, the Public Health Service is chairman of the Work Group V "Water and

Related Land Resources Development." Staff members also hold membership in each of the other four Work Groups. As members of the work group, the staff members are chairmen of the task forces assigned the reponsibilities for water supply, water quality and water quality control. Through these activities the staff has gained the cooperation of the other six Federal agencies and ten Basin States who are participating in the work of the Standing Committee on Comprehensive Basin Planning.

Water Resources Section has worked closely with the Missouri Basin Engineering Health Council and maintains liaison with other Federal and State agencies interested in water resources management.

PRIMARY FUNCTIONS OF THE PROJECT:

Many data concerning water quality and pollution have been collected in the Missouri-Souris-Red River Basins and are available for use in the study. The majority of these data, focused on specific or localized problems, were used in the development of more than 200 reports concerning water quality and pollution studies by State and Federal agencies since 1950. In most cases, these reports have not evaluated the effects on water quality for specific beneficial uses of the resources development programs. Neither have these reports developed the predictive techniques necessary to arrive at reasonable estimates of future water quality problems, under a variety of development schemes. The Comprehensive Water Pollution Control Program will be directly involved with these planning aspects.

The development of the Comprehensive Program will require specific investigations where adequate data are not available. Studies of

existing water supply and waste treatment facilities, economic and population data, stream dynamics and water use-waste load relationships will be undertaken in cooperation with local, State, Interstate and other Federal agencies having responsibility for water pollution control and water resources development. The studies will be coordinated with the activities of the International Joint Commission's work in the Red River of the North area and with the activities of the Missouri Basin Inter-Agency Committee and its Standing Committee for Comprehensive Planning in the Missouri Basin. The following specific activities are planned.

Inventories - Inventories of existing water facilities will be made to provide data on the present use of surface and ground water for domestic, municipal, industrial, agricultural water supplies, navigation, irrigation, and other purposes. These inventories will contain information on uses, amount of water used, location of withdrawal, water supply systems, and treatment facilities.

Water pollution inventories will provide necessary information on all sources of pollution such as location, kind, amount, and characteristics of the wastes. Sources of pollution will include combined sewer overflows, surface runoff, municipal and industrial sewer system outfalls, waste treatment facilities, and agricultural waste waters.

Economic and Population Studies - Economic projections, based on data provided by the Office of Business Economics of the Department of Commerce will be made for the entire River Basin. These projections will provide a basis on which to forecast future industrial development, including projected size of plants, distribution of labor force and job opportunities.

Estimates of future water use and needs and types and amounts of resulting wastes of municipal growth and industrial activities will be developed for the basin.

Stream Dynamics - These studies will include detailed measurements of the present physical, chemical, and biological qualities of water of the area. Past records will be evaluated and detailed measurements made to determine the amounts, distribution and seasonal variation in quality. A computerized storage and retrieval system will be employed to make these data readily available for any given area. Hydrologic studies will be made to measure the velocity, depth, turbulence, stratification, effects of impoundments, regulating devices and other physical characteristics of the waterways.

Interpretations of these data will show cause and extent of water quality deterioration; effect of various hydraulic features on water quality and indicate where protective measures are needed to maintain suitable water quality. The implementation of a Comprehensive Water

Pollution Control Program will minimize the various pollutional problems as well as provide a basis for future development.

COMPREHENSIVE MANAGEMENT PROGRAM:

Knowledge obtained from these complex interrelated studies will give a picture of the present and past conditions of the water resources system. Estimates of future water requirements and waste discharges, based on economic and demographic studies, runoff, hydrologic features, and other data will provide a base from which remedial and protective measures required to achieve the desired objective of managing the water quality of the basin can be determined. These data will be used in the development and application of mathematical analyses or models that will provide:

1. information relative to those factors which affect water quality for different development conditions, existing at predetermined times in a given area.
2. information relative to the effectiveness of alternative investments, permitting the selection of the least cost combinations of alternatives, which will accomplish a specific pollution control (i.e., water quality) condition.

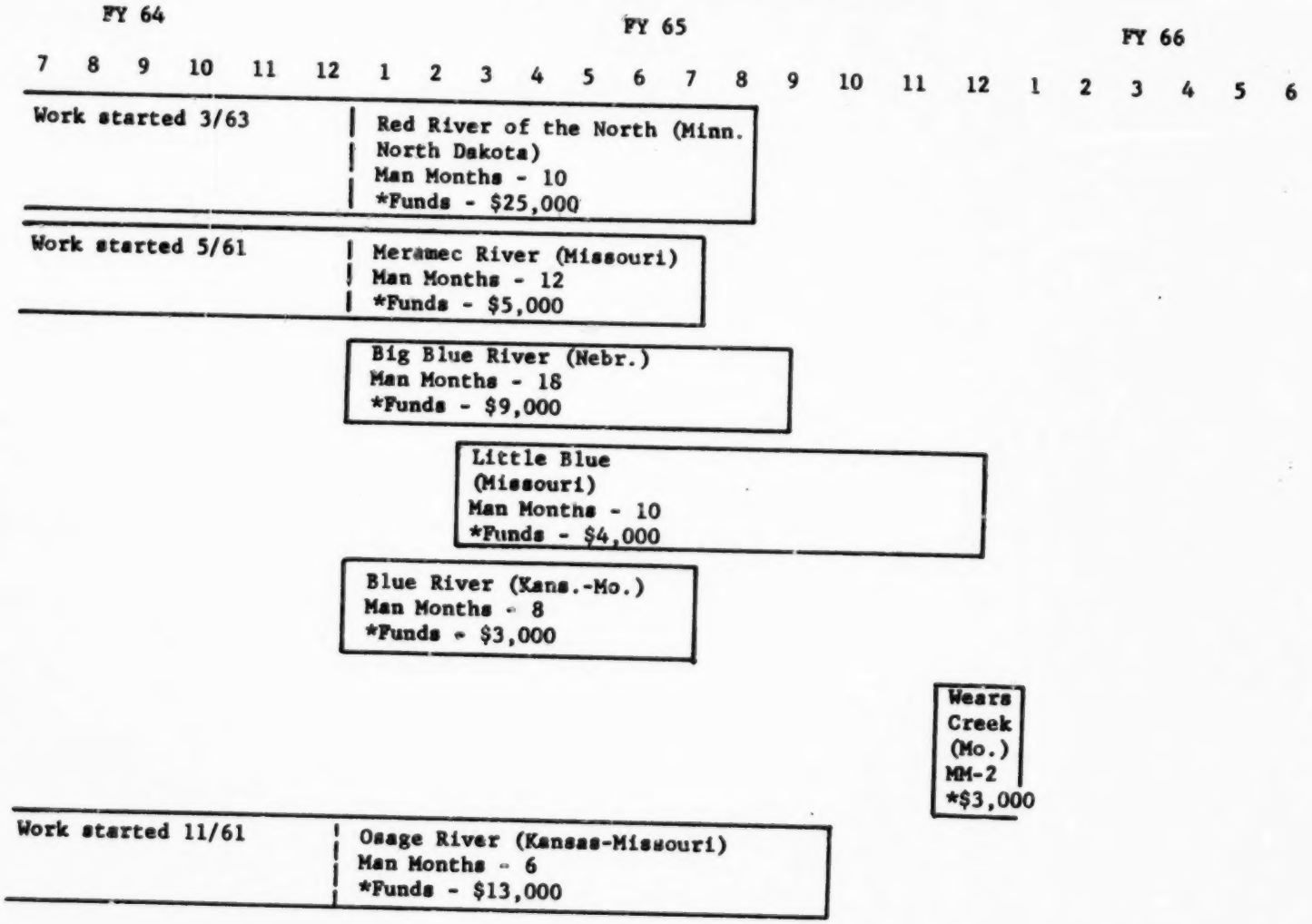
Guidelines relating to water resource development projects, beneficial water use, treatment technology, and planning constraints will be established to assure optimum water pollution control and quality management. The Comprehensive program will be based on the projection of future conditions. The completed plan will be flexible

in order to allow future generations the greatest choice of alternatives in the conservation, development and use of the water and related land resources.

WATER SUPPLY AND/OR POLLUTION CONTROL REPORTS:

Ten reports are scheduled for completion during Fiscal Year 1965. These are shown on the schedule of water resources studies. The total of reimbursable funds paid or obligated for these projects during Fiscal Year 1965 was $45,673. Our staff is not adequate to keep up with the work load and it has therefore not been possible to meet the scheduled dates of completion. We have requested authority for additional staffing.

Schedule of Water Resources Studies



Schedule of Water Resources Studies
(Cont'd)

FY 64						FY 65												FY 66					
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6

Gasconade (Missouri)
Man Months - 6
*Funds - $10,000

Fishing River (Missouri)

Upper Missis-ippi (Minn.)

ippi
(Minn.)

Nemaha (Nebraska)

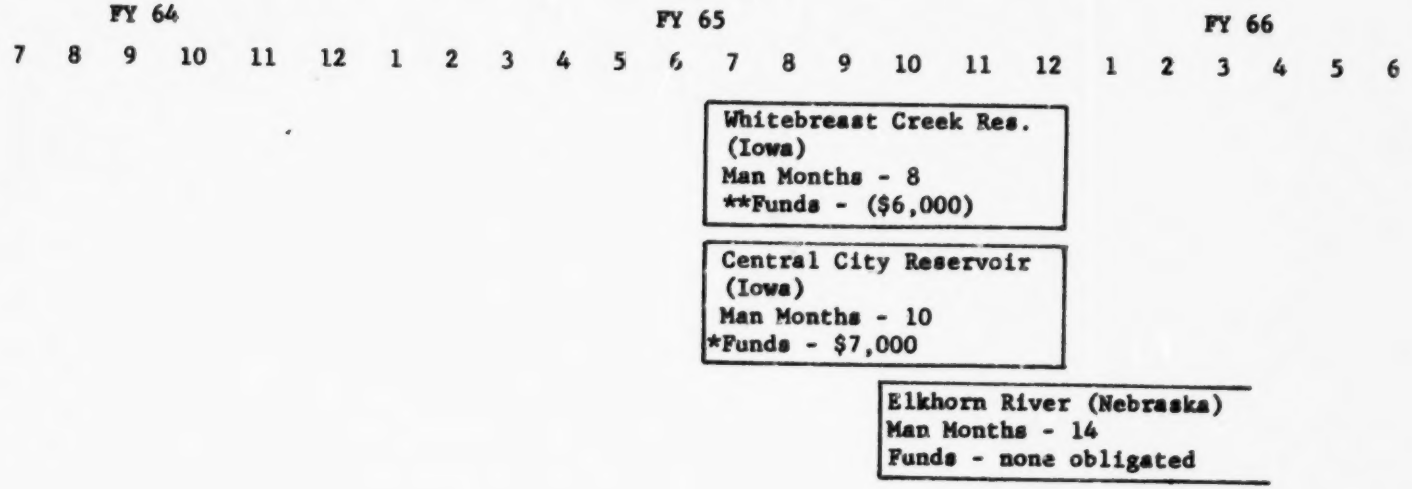
Platte
(Iowa-
Mo.)

Skunk
River
(Ia.)
MM - 1
***

Man Months - 8
Funds - none obligated

Jefferson and
Walnut Creek Resvrs.
(Iowa)
Man Months - 12
**Funds - ($6,000)

Schedule of Water Resources Studies
(Cont'd)


FY 64
FY 65
FY 66
7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6
Whitebreast Creek Res.
(Iowa)
Man Months - 8
**Funds - ($6,000)
Central City Reservoir
(Iowa)
Man Months - 10
*Funds - $7,000
Elkhorn River (Nebraska)
Man Months - 14
Funds - none obligated

Total reimbursable funds available in FY 1965 - $45,673.00
*Total reimbursable funds paid or obligated for project
**$6,000 is for the following reports: Jefferson Reservoir, Walnut Creek Reservoir, and Whitebreast Creek Reservoir (Iowa)
***Preliminary letter-type report

PLAN AND SCHEDULES FOR FISCAL YEAR 1966:

With the establishment of Headquarters and the hiring of personnel, the following activities will be initiated:

1. A project management scheme for the development phase of the Project will be provided--probably through contract.

2. STORET river mile coding will be started for the project area in Missouri, Kansas, and Nebraska through contracts with universities. Storage of data will be begun primarily through cooperation with the States.

3. A model of the Kansas River will be developed by contract.

4. Inventories of industrial waste will be updated in Kansas.

5. Development of water supply and water pollution control reports will continue, as required by Federal construction agencies.

The staff will continue its participation in the work of the Standing Committee for Comprehensive Planning of the Missouri Basin Inter-Agency Committee. A working paper for the Lower Missouri Tributaries is scheduled for early completion and work is to be started on similar documents for the Yellowstone and Platte River Basins. Much of the data required for the development of these working papers will be supplied by the Work Groups of the Standing Committee on Comprehensive Planning. These activities can be well coordinated with the overall work plan for the comprehensive project.

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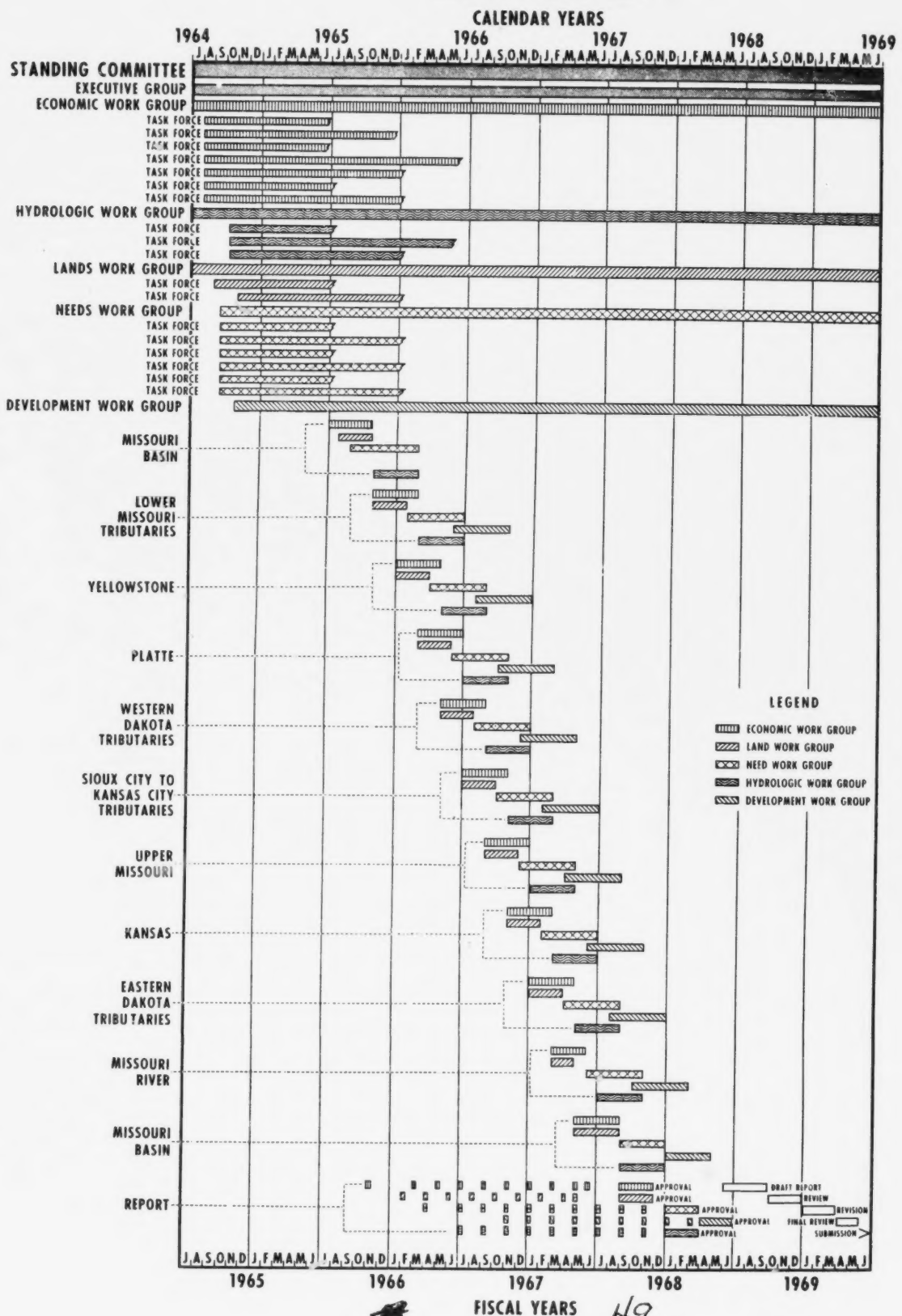
COMPREHENSIVE BASIN PLANNING
TENTATIVE SCHEDULES



MISSOURI BASIN PROJECTS PLANNED FOR THE FUTURE BUT NOT SCHEDULED

PROJECT	SPONSOR	TARGET DATE FY
Cache L. Poudre (Colorado)	Denver Bureau of Reclamation	1966
Julesburg (Colo.-Nebr.)	Denver Bureau of Reclamation	1968
Narrows Unit (Colorado)	Denver Bureau of Reclamation	1967
Upper South Platte (Colorado)	Denver Bureau of Reclamation	1968
St. Vrain (Colorado)	Denver Bureau of Reclamation	1966
Grayrocks (Wyoming)	Denver Bureau of Reclamation	1965
Glendo Inundated (Wyoming)	Denver Bureau of Reclamation	1965
LaPrele (Wyoming)	Denver Bureau of Reclamation	1965
Sheep Creek (Nebraska)	Denver Bureau of Reclamation	1967
West Platte (Wyoming-Nebraska)	Denver Bureau of Reclamation	1970
Ponca Creek (Nebraska)	Denver Bureau of Reclamation	1969
Mid State (Nebraska)	Denver Bureau of Reclamation	1966
Crofton (Nebraska)	Denver Bureau of Reclamation	1967
Abilene (Kansas)	Denver Bureau of Reclamation	1967
Belvue (Kansas)	Denver Bureau of Reclamation	1968
Chapman (Kansas)	Denver Bureau of Reclamation	1968
Clay Center (Kansas)	Denver Bureau of Reclamation	1970
Concordia (Kansas)	Denver Bureau of Reclamation	1970
Grantville (Kansas)	Denver Bureau of Reclamation	1968
Kipp (Kansas)	Denver Bureau of Reclamation	1967
Lawrence (Kansas)	Denver Bureau of Reclamation	1969
Menoken (Kansas)	Denver Bureau of Reclamation	1968
Oberlin (Kansas)	Denver Bureau of Reclamation	1967

MISSOURI BASIN PROJECTS PLANNED FOR THE FUTURE BUT NOT SCHEDULED (Cont'd)

PROJECT	SPONSOR	TARGET DATE
O'Neill (Nebraska)	Denver Bureau of Reclamation	1968
Niobrara River (Nebraska-Wyoming)	Denver Bureau of Reclamation	1967
Wilson (Kansas)	Denver Bureau of Reclamation	1966
Perry (Kansas)	Denver Bureau of Reclamation	1970
Rossville (Kansas)	Denver Bureau of Reclamation	1970
Des Moines (Iowa)	Rock Island Corps of Engineers	1967
Iowa River (Iowa)	Rock Island Corps of Engineers	1966
Cedar River (Iowa)	Rock Island Corps of Engineers	1966
Wapsipinicon River (Iowa)	Rock Island Corps of Engineers	1966
Zumbro River (Minnesota)	Rock Island Corps of Engineers	
Root River (Minnesota)	Rock Island Corps of Engineers	
Musselshell Unit (Montana)	Billings Bureau of Reclamation	1966
Marias Milk Unit (Montana)	Billings Bureau of Reclamation	1967
Mott Unit (North Dakota)	Billings Bureau of Reclamation	1967
Pollock Herreid Unit (South Dakota)	Billings Bureau of Reclamation	1967
Shoshone Extension Unit (Wyoming)	Billings Bureau of Reclamation	1967
Wagner Unit (South Dakota)	Billings Bureau of Reclamation	1965
Knife Division (North Dakota)	Billings Bureau of Reclamation	1965
Northeast Montana Division (Montana)	Billings Bureau of Reclamation	1966
Wind Division (Wyoming)	Billings Bureau of Reclamation	1965
Kaycee (Hole-in-Wall Reservoir Powder River)	Billings Bureau of Reclamation	1966
Oahe (South Dakota)	Billings Bureau of Reclamation	1968

MISSOURI BASIN PROJECT PLANNED FOR THE FUTURE
BUT NOT SCHEDULED
(Cont'd)

PROJECT	SPONSOR	TARGET DATE
Papillion Creek (Nebraska)	Omaha Corps of Engineers	1966
Niobrara River-Gavins Point (Nebraska and South Dakota)	Omaha Corps of Engineers	1966
Nishnabotna River (Iowa)	Omaha Corps of Engineers	1966
Little Sioux River (Iowa-Minnesota)	Omaha Corps of Engineers	1967
Platte River (Nebraska)	Omaha Corps of Engineers	1967
Big Sioux River (Iowa-South Dakota Minnesota)	Omaha Corps of Engineers	1968
Cheyenne River (South Dakota - Wyoming)	Omaha Corps of Engineers	1968
Elkhorn River (Nebraska)	Omaha Corps of Engineers	1968
Aowa and South Creeks (Nebraska)	Omaha Corps of Engineers	
Bow Creek (Nebraska)	Omaha Corps of Engineers	
Boyer River (Iowa)	Omaha Corps of Engineers	
Floyd River (Iowa)	Omaha Corps of Engineers	
James River (North Dakota-South Dakota)	Omaha Corps of Engineers	
White River (Nebraska-South Dakota)	Omaha Corps of Engineers	
Omaha Creek (Nebraska)	Omaha Corps of Engineers	
Perry Creek (Iowa)	Omaha Corps of Engineers	
Shell Creek (Nebraska)	Omaha Corps of Engineers	
Soldier Creek (Iowa)	Omaha Corps of Engineers	
Weeping Water Creek (Nebraska)	Omaha Corps of Engineers	
Salt Creek (Nebraska)	Omaha Corps of Engineers	
Sun River (Montana)	Omaha Corps of Engineers	
Marias River (Montana)	Omaha Corps of Engineers	
Skunk Creek (South Dakota)	Omaha Corps of Engineers	
Niobrara River (Nebraska-Wyoming)	Omaha Corps of Engineers	

SUMMARY OF ACTIVITIES:

With the establishment of the project, the Public Health Service will be able to develop a program to improve, protect, and preserve the quality of surface and ground waters for all anticipated beneficial uses and meet its water pollution control responsibilities. The first year will be devoted to limited staffing, the development of a PERT Diagram for operations, the installation of the STORET System of data storing and retrieval, the establishment of a river mileage code and the assembling of available data germane to the study.

We will continue to work closely with the Standing Committee of the Missouri Basin Inter-Agency Committee and will continue the development of municipal and industrial water supply and/or pollution control reports for Federal agencies.

In Fiscal Year 1967, we hope to complete the river mile coding and continue work on the storing of available data. During this Fiscal Year we will begin an economic base study and analysis using data supplied by the Office of Business Economics, Department of Commerce. With an expansion of staff, we will be able to begin inventories of water use and waste discharges by regions (as established by the Standing Committee for Comprehensive Basin Planning of the Missouri Basin Inter-Agency Committee). Our cooperation will continue with the Standing Committee for Comprehensive Planning of the Missouri Basin Inter-Agency Committee and it is anticipated that working papers will be completed during Fiscal Year 1967 for the Yellowstone, Platte, Western Tributaries of the Missouri, the Main

Stem and Tributaries from Sioux City to Kansas City, and the Upper Missouri Regions of the Missouri Basin. See Comprehensive Basin Planning Tentative Schedules on page 37. These working papers will include all of the basic data available regarding the present use of the water resources for all beneficial uses and will project the needs to meet future requirements. These studies will be based entirely on existing data and will be of the Type I category. They will serve as an excellent base for the planning operation of the comprehensive program. Our studies will be coordinated with the activities of the other agencies and information supplied as required to meet the time schedules of the Comprehensive Framework Plan.

The Comprehensive Water Pollution Control Study will, however, go beyond the basic needs of the framework study and will be based on as complete knowledge as is possible to acquire of present water quality conditions in the Basin, factors which will determine future water quality and alternate means of controlling water pollution to assure satisfactory water quality in the future. The study will be concerned with present and projected water requirements for domestic, municipal, industrial, and agricultural purposes and with the management of the quality of the water resources for public health, community growth, industrial and commercial development, recreation, fish, wildlife, and agriculture. Results of the study will supplement other available reports and proposed studies of the ten basin states, the Corps of Engineers, the Bureau of Reclamation, Soil Conservation Service, Federal Power Commission, Department of Commerce, Department of Labor and other Federal Agencies. The program will delineate

problem areas and suggest possible solutions, project population and economic growth, predict future water supply needs and related waste disposal requirements, outline water quality objectives and proposed means of meeting those objectives, estimate future needs, benefits and cost of streamflow regulation and suggest research studies for projects necessary to increase knowledge in specific fields of interest. In the development of the plan, careful attention shall be given to maintaining a balance between engineering, economic, and planning aspects of the long range comprehensive water pollution control programming. The plan will be developed with full cooperation of all the Federal, State, Interstate, municipal and private interests in the Missouri Basin.

When funds are available, we will establish and equip a central laboratory in Kansas City.

ORGANIZATION AND MANAGEMENT

PROJECT SCHEDULE:

The purpose of the project is to develop, in accordance with the Federal Water Pollution Control Act (33 USC 466a), an effective comprehensive water pollution control program in full cooperation with all of the Federal, State, Interstate, municipal and private interests of the Missouri Basin.

The Missouri-Souris-Red River Basins Comprehensive Water Pollution Control Project study area includes all the tributaries, in the continental United States, of the Missouri, the Souris and the Red (of the North) Rivers. The drainage area of these river systems is about one-sixth of the total area of the Nation and includes parts or all of ten states.

The development of the Comprehensive Water Pollution Control Program for the river basins will require a full range of technical activities including comprehensive engineering, chemical, biological, bacteriological, hydrological, economic and demographic studies. The Missouri-Souris-Red River Basins Comprehensive Program will cost approximately $4,500,000 to develop and completion of the program will require seven years. A maximum staff of 60 will be employed.

One of the first tasks of the Project staff will be the development of the PERT Diagram. The desirability of contracting for a program evaluation and review technique diagram, showing the relationship of each major activity and permitting the development of the critical path of program operation, will be explored with the assistance of the Washington Headquarters Office. Activities of the project will be coordinated with the Missouri Basin Inter-Agency Committee's study.

During Fiscal Year 1966, the STORET river mile coding will be

completed for the project area in Missouri, Kansas and Nebraska. This work may be handled through contract with universities or other local groups. The storage of data, in cooperation with the State, will be begun in Kansas. It is hoped that the river mile coding for the entire basin can be completed in Fiscal Year 1967.

Inventories of industrial waste will be updated throughout the basin. Inventories for the States of Kansas, Missouri, Nebraska and Iowa will be scheduled first.

In Fiscal Year 1966, the project will begin extension of the Red River report prepared for the Corps of Engineers in the full concept of a comprehensive program. The results of the investigations by the International Joint Commission and work done in connection with basin enforcement action will be incorporated into the comprehensive program for the Red River of the North.

The Project staff will continue the participation in the work of the Standing Committee for Comprehensive Planning of the Missouri Basin Inter-Agency Committee.

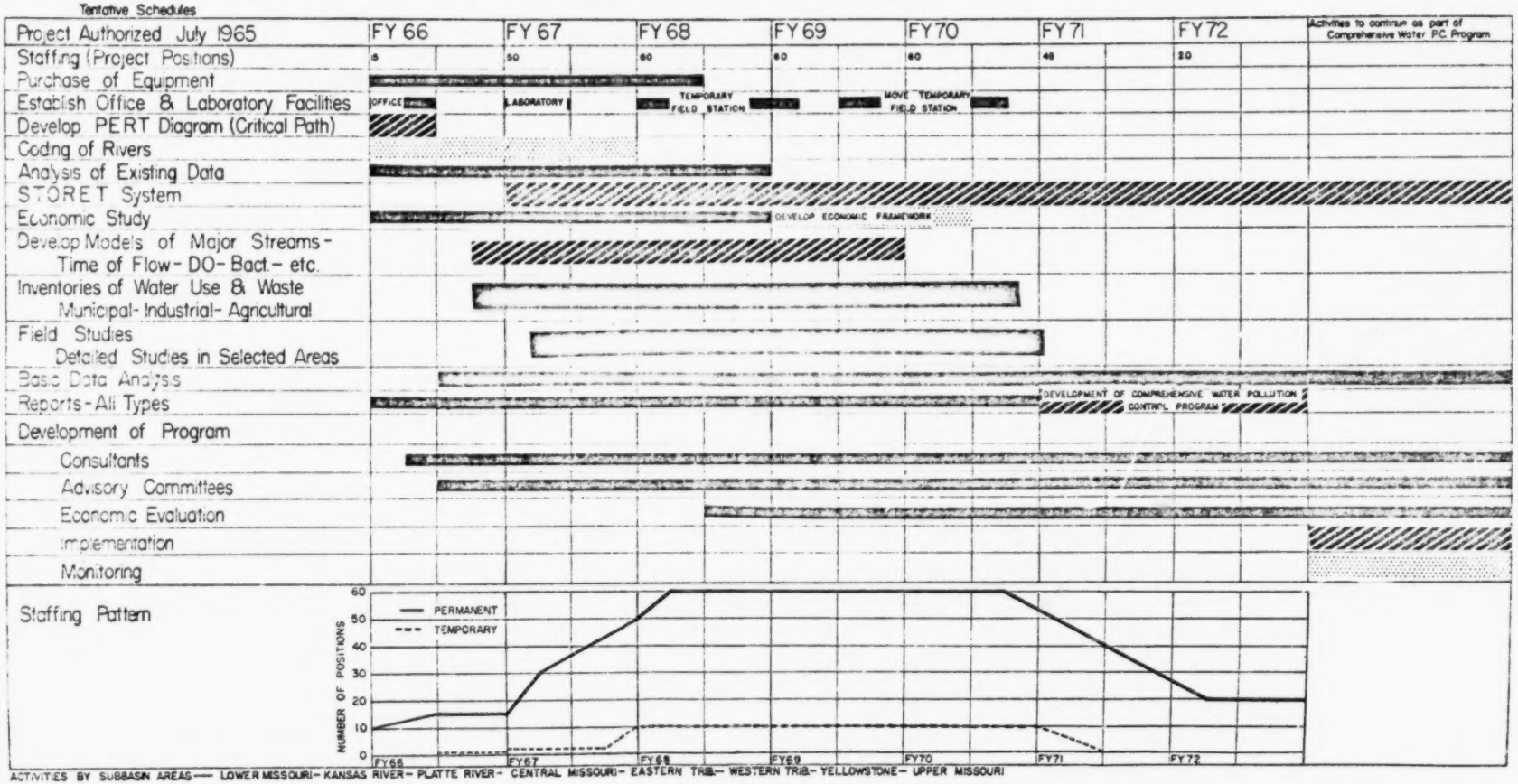
The Project staff will continue the development of Water Supply and Water Pollution Control Reports for Federal construction agencies in accordance with the Federal Water Pollution Control Act (33 USC 466a). These reports will be considered as an integral input to the potential management of water pollution for the area rather than a separate activity. The responsibility under Section 2(b) in the Missouri Basin drainage for Colorado, Montana and Wyoming now being handled by Region VIII will be transferred to the project in Fiscal Year 1967.

Arrangements regarding communications, planned activities and contact with the State and local agencies have been worked out to the

mutual satisfaction of the Regional Program Directors of Water Supply and Pollution Control activities in Regions VI and VIII of the Public Health Service.

MISSOURI-SOURIS-RED RIVER BASINS
COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

Tentative Schedules



ACTIVITIES BY SUBBASIN AREAS — LOWER MISSOURI - KANSAS RIVER - PLATTE RIVER - CENTRAL MISSOURI - EASTERN TRIB. - WESTERN TRIB. - YELLOWSTONE - UPPER MISSOURI

Kansas City, Missouri — 1965

PERSONNEL SUMMARIES OF POSITIONS AUTHORIZED AND FILLED AS OF JANUARY 1, 1966

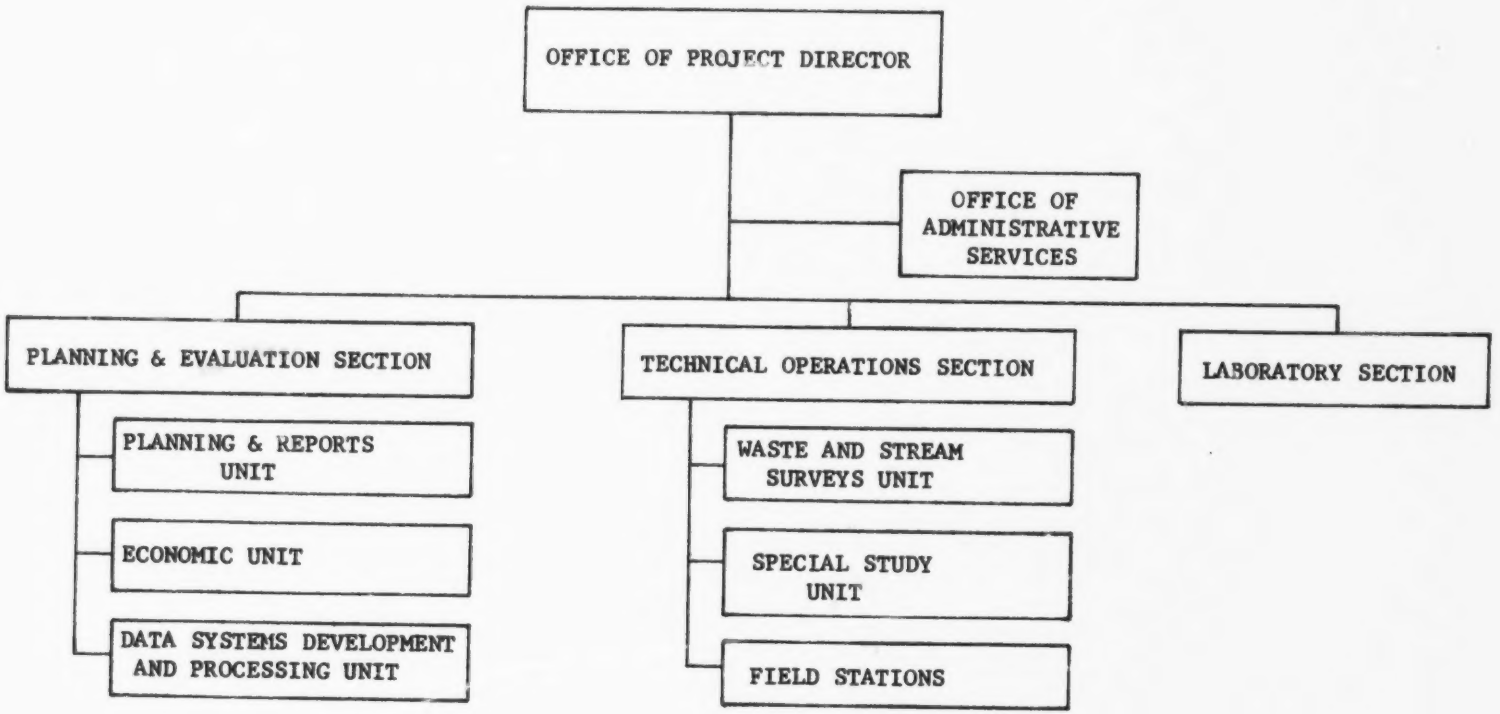
Unit and Position Title		Grade or Rank	Series	Position Number	Incumbent
Director	S. San. Engr.	GS-15	819	EH-65-418	Young
Deputy Director	S. San. Engr.	GS-14	819	EH-65-415	
Secretary		GS-5	318	330	Collier
Economist		GS-13	110	EH-63-226	Hajinian
Chief Technical Operation Section		GS-14	819	EH-65-	
Chemical Engineer		GS-13	893	BSS 4771	
Hydrologist	(HSO)	GS-12	1315	7318	Draper
Admin. Officer		GS-11	341	EH-63-64	Dolginoff
Sanitary Engr.		GS-11	819	EH-65-413	
Economist		GS-9	110	EH-65-412	
Biologist		GS-9	401	EH-65-414	Powers
Data System Analyst		GS-9	334		
Statistical Clerk		GS-5	1531	448	Kennedy
Steno		GS-4	331	331	Amos
*Steno		GS-4	331	331	Mikes
*Sanitary Engr.		GS-12	819	EH-65-672	Holtrop
*Hydraulic Engr.		GS-11	1315	EH-65-671	

*Reimbursable Positions

All Duty Stations in Kansas City, Missouri

MISSOURI-SOURIS-RED RIVER BASINS COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

ORGANIZATIONAL CHART



Organization & Staffing
Exhibit I

EXHIBIT II - ORGANIZATION AND STAFFING

FUNCTIONAL STATEMENT

FOR

MISSOURI-SOURIS-RED RIVER BASINS

COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

Missouri-Souris-Red River Basins Comprehensive Water Pollution Control Project

1. Evaluates all existing water supply and pollution control and related water resource information in the project area - Missouri, Souris and Red River of the North watersheds in North Central United States.

2. Develops new knowledge and projections of future conditions to supplement existing information in cooperation with Federal, State, Interstate, municipal and other public and private entities.

3. In accordance with Section 2 (A), Federal Water Pollution Control Act, as amended (33 U.S.C. 466 et seq), prepares a comprehensive water pollution control program for the project area, taking into consideration all legitimate water uses.

Office of the Project Director

1. Interprets Division policy ir order to establish project objectives.

2. Formulates guidelines for the accomplishment of these objectives.

3. Directs and administers project activities.

4. Reports project accomplishments to higher authority.

5. Represents the project in relationships with cooperation public and private entities.

Office of Administrative Services

1. Interprets policy and establishes administrative procedures for the operation and management of the project.

2. Procures and manages space, equipment, supplies and services for the project.

3. Plans and manages the project's fiscal affairs.

4. Provides the project with personnel management.

Planning and Evaluation Section

1. Plans project activities to accomplish objectives established by the Office of the Project Director.

2. Coordinates activities of the various organizational components of the project on a continuous basis.

3. Evaluates project activities and reports on accomplishments.

4. Develops and utilizes system analyses.

Planning and Reports Unit

1. Designs work plans and schedules to insure coordination of laboratory, engineering, and management capabilities.

2. Evaluates existing and project-developed information for purposes of program planning and reporting.

3. Develops reports on project activities and accomplishments.

Economic Unit

1. Evaluates existing population, demographic and industrial development data.

2. Projects population, demographic and industrial development.

3. Development of water quality benefit-cost techniques.

Data Systems and Processing Unit

1. Develops and utilizes appropriate information, processing, storage and retrieval systems for the project.

Operations Section

1. Provides all field engineering services to project.

2. Directs and coordinates operation of program (field) offices.

Stream and Waste Survey

1. Designs and implements field inventories, measurements and sampling programs.

2. Provides expertise in ground and surface water hydrology.

Special Studies Unit

1. Investigates pollutional effects of municipal, industrial, and agricultural waste loadings in selected geographic areas.

Program Offices

1. Maintain liason with agencies and other public and private entities interested in water quality studies in an assigned area.

2. Provide intelligence on ground and surface water hydrology.

3. Implement field inventory, measurements and sampling programs in an assigned area.

Laboratory Section

1. Provides laboratory support in chemistry, biology, microbiology and related sanitary sciences at a central facility.

2. Anlayzes samples, interprets, and reports the findings.

3. Develops appropriate laboratory procedures for accomplishment of project objectives.

STAFFING ROSTER
MISSOURI-SOURIS-RED RIVER BASINS
COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

Filled Permanent Positions: 1965-0; 1966-14; 1967-35; 1968-59 (peak)
(1966-3 Reimbursable Positions--see below)

Unit and Position Title	Grade or Rank	Series	Position Number	Duty Station	Incumbent	Year of EOD
OFFICE OF PROJECT DIRECTOR						
Project Director (Supv San Eng)	GS-15	819	EH-65-418	Kansas City, Mo.	Young	1966
Deputy Project Director (Supv San Eng)	GS-14	819	EH-65-415	" "	[redacted]	1966
Secretary	GS- 6	318	330	" "	Collier	1966
OFFICE OF ADM SERVICES						
Administrative Officer	GS-11	341	EH-63-413	" "	(Dolginoff)	1966
Ass't. Administrative Officer	GS- 5	341		" "		1967
Clerk-Steno	GS- 4	312		" "		1967
PLANNING AND EVALUATION SECTION						
Chief, Planning & Evaluation (Supv San Eng)	GS-14	819		" "		1967
Secretary	GS- 5	318		" "		1967
Planning & Reports Unit						
Planning Engr (System Analysis)	GS-12	813		" "		1967
Cartographic Draftsman	GS- 5	816		" "		1967
Librarian	GS- 5	1410		" "		1968
Clerk-Steno	GS- 4	312		" "		1968
Economic Unit						
Chief Economist	GS-13	110	EH-63-226	" "	[redacted]	1966
Economist	GS- 9	110	EH-65-412	" "		1966
Clerk-Steno	GS- 4	312	331	" "	Amos	1966

STAFFING ROSTER
MISSOURI-SOURIS-RED RIVER BASINS
COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

Unit and Position Title	Grade or Rank	Series	Position Number	Duty Station	Incumbent	Year of EOD
Data Systems Development & Processing Unit						
Data Systems Analyst (MAT'D)	GS- 9	334		Kansas City, Mo.		1966
Statistical Clerk	GS- 5	1531	448	" "	(Kennedy)	1966
Statistical Clerk	GS- 3	1531		" "		1967
Clerk-Steno	GS- 3	312		" "		1967
TECHNICAL OPERATIONS SECTION						
Chief, Operations (Supv San Eng)	GS-14	819	EH-65-	" "		1966
Secretary	GS- 5	318		" "		1967
Stream and Waste Surveys Unit						
Hydrologist	GS-12 (HSO)	1315	7318	" "	Draper	1966
Staff Engr. (San)	GS-12	819		" "		1967
Field Engr.(San)	GS-11	819	EH-65-413	" "		1966
Biologist	GS-11	401		" "		1967
Engr. Technician	GS- 5	802		" "		1967
Engr. Technician	GS- 5	802		" "		1967
Engr. Technician	GS- 5	802		" "		1967
Aquatic Sample Collector	WB- 4	-		" "		1968
Aquatic Sample Collector	WB- 4	-		" "		1968
Aquatic Sample Collector	WB- 4	-		" "		1968
Aquatic Sample Collector	WB- 4	-		" "		1968
Aquatic Sample Collector	WB- 4	-		" "		1968
Aquatic Sample Collector	WB- 4	-		" "		1968
Special Studies Unit						
Chemical Engineer	GS-13	893	BSS 4771	" "		1966
Biologist	GS- 9	401	EH-65-414	" "	Powers	1966

STAFFING ROSTER
MISSOURI-SOURIS-RED RIVER BASINS
COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

Unit and Position Title	Grade or Rank	Series	Position Number	Duty Station	Incumbent	Year of EOD
Bismarck Program Office						
Chief of Program Office (Supv San Eng)	GS-13	819		Bismarck, N.D.		1967
Chemist or Biologist	GS-11	1320 or 401		" "		1968
Engr. Technician	GS- 5	802		" "		1968
Engr. Technician	GS- 5	802		" "		1968
Secretary-Steno	GS- 4	318		" "		1968
Billings Program Office						
Chief of Program Office (Supv San Eng)	GS-13	819		Billings, Montana		
Chemist or Biologist	GS-11	1320 or 401		" "		1968
Engr. Technician	GS- 5	802		" "		1968
Engr. Technician	GS- 5	802		" "		1968
Secretary-Steno	GS- 4	318		" "		1968
LABORATORY SECTION						
Chief, Laboratory (Supv Chem)	GS-13	1320		Kansas City, Mo.		1967
Chemist	GS-11	1320		" "		1967
Microbiologist	GS-11	1320		" "		1968
Chemist	GS- 9	1320		" "		1968
Chemist	GS- 9	1320		" "		1968
Bacteriologist	GS-11	403		" "		1967
Physical Science Technician	GS- 7	1311		" "		1968
Physical Science Aide	GS- 4	1311		" "		1968
Laboratory Aide	GS- 3	1398		" "		1968
Clerk-Steno	GS- 3	312		" "		1968

STAFFING ROSTER
MISSOURI-SOURIS-RED RIVER BASINS
COMPREHENSIVE WATER POLLUTION CONTROL PROJECT

Unit and Position Title	Grade or Rank	Series	Position Number	Duty Station	Incumbent	Year of EOD
REIMBURSABLE POSITIONS						
Field Engineer (San)	GS-12	819	EH-65-672	Kansas City, Mo.	(Holtrop)	1967
Hydraulic Engineer	GS-11	1315	EH-65-671	" "		1967
Clerk-Steno	GS- 4	312	331	" "	Mikes	1967

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WORKING BUDGET
Request for Funds, Fiscal Year 1966 Revised 8-30-65

Region and Location VI, Kansas City, Mo. Program/Project No. and Title Water Resources - 207/646 Missouri Comprehensive Project

1965 Allowance No. 5-3116	1965 Actual	1966 Request	Increase or Decrease
1. Request			
11 Personnel Compensation (Total)	52,856.	106,919.	+ 54,063.
Compensation other than consultants			
Consultants' fees			
12 Personnel benefits	7,297.	10,394.	+ 3,097.
21 Travel			
Change of station including dependents and dislocation allowance	15.		- 15.
Other Travel	7,142.	10,000.	+ 2,858.
22 Transportation of things			
Change of station			
Other	8.	50.	+ 42.
23 Rents, communications & utilities (Do not include space rental)	875.	1,800.	+ 925.
24 Printing and reproduction	4,592.	2,800.	- 1,792.
25 Other services			
Contracts (Itemize)		92,000.	+ 92,000.
Other	667.	400.	- 267.

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WORKING BUDGET
Request for Funds, Fiscal Year 1966 --Cont'd Revised 8-30-65

Region and Location VI, Kansas City, Mo. Program/Project No. and Title Water Resources - 207/646 Mo. Comprehensive Project

1965 Allowance No. 5-3116	1965 Actual	1966 Request	Increase or Decrease
26 Supplies and materials	722.	5,363.	+ 4,641.
31 Equipment (Itemize and justify. Use separate sheet if necessary)	645.	4,274.	+ 3,629.
Total	74,819.	234,000.	+ 159,181.

Explanation of Justification for Increase

Equipment for Fiscal Year 1966:

Desks, chairs, etc. for new personnel	300.
2 DO meters and model 51 oxygen meter	984.
2 fluorometers and accessories	2,540.
2 millipore filter kits	450.
TOTAL	4,274.

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WORKING BUDGET
Request for Funds, Fiscal Year 1966 --Cont'd Revised 8-30-65

Region and Location VI, Kansas City, Mo.

Program/Project No. Water Resources - and Title 207/646 Mo. Comprehensive Project

1965 Allowance No. 5-3116

2. Requested Apportionment

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Total
Personnel compensation & Benefits	19,805.	28,068.	34,433.	35,007.	117,313.
Travel	2,000.	2,500.	2,750.	2,750.	10,000.
Contracts		20,000.	30,000.	42,000.	92,000.
Other	2,000.	5,000.	5,000.	2,687.	14,687.
Total	23,805.	55,568.	72,183.	82,444.	234,000.
Permanent Positions	8	14	14	14	
Other	0	0	0	0	

Justification for Unequal Apportionment

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Personnel on Duty as of April 1, 19 65 (Current Year)
and
Personal Services Request for FY 19 66 (Budget Year) Revised 8-30-65

Region and Location VI, Kansas City, Missouri

Program/Project No. and Title Water Resources - 207/640 Missouri Comprehensive Project

19 65 Allowance No. 5-3116

Position Title	Encumbent (as of ~~XXX~~ 6/1/65)	Grade 1/	Current Annual Rate	1966 Request Compensation	1966 Request Benefits	Remarks 2/
Authorized 1965 positions:						
Supervisory San. Engr.	Young, Lewis A.	GS-14/8	17,600.	18,522.	1,347.	Incumbent to Project Director. Position figured on basis of GS-15/5 $18,740 from 10-1-65.
Chief, Economist	Hajinian, Charles H.	GS-13/2	12,495.	12,947.	966.	PSI to GS-13/3 $12,915. due 7-18-65.
Staff Engr. (Chem.)	Wicks, Arlein T.	GS-13/4	13,335.	3,384.	252.	To Reimbursements, Project 680, approx. 10-1-65.
Engineer	Reid, Billy H.	SA (+2)	7,546.	1,061.	457.	+3 yrs. eff 6-21-66. Tsfrd to Indian Health 9-10-65.
Hydrologist	Draper, Donald C.	Full (+8)	9,512.	7,604.	2,521.	+10 yrs eff. 5-28-66.
Secretary	Collier, Linda R.	GS-5/3	5,330.	5,626.	385.	Incumbent to Project Director's Sec. position figured on basis of GS-6/2 $5,690 from 10-1-65.
Clerk-Stenographer	Robinson, Betty J.	GS-4/1	4,480.	4,489.	351.	Robinson tsfrd out 8-28-65 Kathy Mikes, GS-4/1 to EOD 9-12-65
Clerk-Stenographer	Amos, Eva Jean	GS-4/1	4,480.	4,514.	344.	PSI to GS-4/2, $4630., due 5-8-66.

1/ for commissioned officers indicate years of service (i.e. +4,+6, etc.) as well as grade.

2/ Indicate what causes the request to be other than a normal full year projection of the position. Note such things as change in program assignment at beginning of fiscal year; accession, separation, reassignment, or transfer dates; dates of intra-program transfers between projects; etc.

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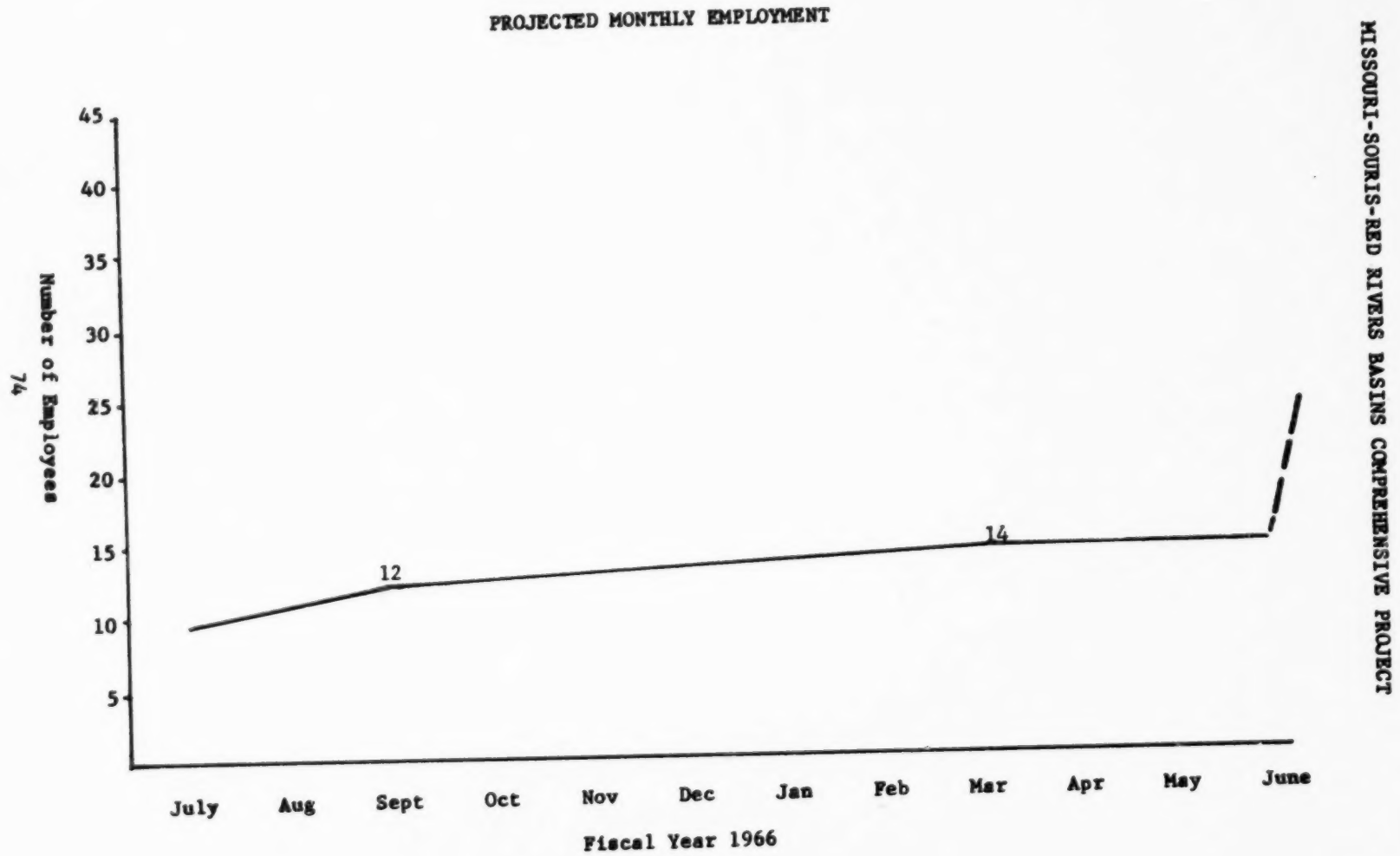
Personnel on Duty as of April 1, 1965 (Current Year)
and
Personal Services Request for FY 1966 (Budget Year) Revised 8-30-65

Region and Location VI, Kansas City, Missouri

Program/Project No. and Title Water Resources - 207/640 Missouri Comprehensive Project

1965 Allowance No. 5-3116

Position Title	Encumbent (as of 6/1/65)	Grade 1/	Current Annual Rate	1966 Request Compensation	1966 Request Benefits	Remarks 2/
Supervisory San. Engr - Deputy Project Director		GS-14/1	14,170.	8,281.	614.	To EOD late in 2nd Qtr. Figured from 12-1-65.
Engineer		GS-12	10,250.	5,995.	458.	In lieu of Chem Engr. (Wicks) GS-13, tsfrd to Reimbursements approx 10-1-65. To EOD in 2nd Qtr. Figured from 12-1-65
Engineer		GS-11	8,945.	5,986.	463.	In lieu of vacancy(vice Witherow)To EOD approx 11-1-65.
Engineer		GS-11	8,945.	5,986.	463.	To EOD approx. 11-1-65
Administrative Officer		GS-11/1	8,650.	6,490.	505.	To EOD in 2nd Qtr. Figured from 10-1-65.
Data Systems Analyst		GS-11/1	8,650.	5,791.	450.	To EOD in 2nd Qtr. Figured from 11-1-65.
Economist		GS-9/1	7,220.	5,413.	432.	To EOD in 2nd Qtr. Figured from 10-1-65.
Biologist		GS-9	7,220.	4,830.	386.	In lieu of Reid. To EOD approx 11-1-65.
TOTALS				106,919.	10.394	


PROJECTED MONTHLY EMPLOYMENT
MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT
Number of Employees
45
40
35
30
25
20
15
10
5
12
14
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June
Fiscal Year 1966

I. SPECIAL PURPOSE SPACE INVENTORY AND PROJECTED SPACE REQUIREMENTS

Types of Space	Current F. Y. 1966		Budget F. Y. 1967		Budget F. Y. 1968		As of End of Budget F. Y. 1968	
	Total Authorized Employee Increases	Space Requested And/Or Acquired	Total Anticipated Employee Increases	Anticipated Additional Space Requirement	Total Anticipated Employee Increases	Anticipated Additional Space Requirement	Total Positions (Cols. 1+3+5)	Total Space Requirement (Cols. 2+4+6
1. Laboratory Space			4 1/	5000	6			5000
2. Other Related Space								
a. Office Space	15	2100	28	3050	3	300	54	5450
b. Major Conference Rooms		800						800
c. Storage and Supply Rooms		2000		1500				3500
d. Central Reproduction		400						400
e. Concessions		400						400
f. Centralized Banks of Files		200						200
g. Circulation Space		600						600
h. Automatic Data Processing 2/				400				400
i. Graphic Arts		300						300
j. Other (specify) Tech. Library		500						500
Subtotal (2.a. - n.)		7300		4950		300		12,550
Total (1. and 2.)		7300		9950		300		17,550

1/ Includes two supervisors provided office space under Item 2a.

2/ Includes keypunch machine and card storage.

- SPACE

OFFICE SPACE OCCUPACY BY GRADE AND FOOTAGE

GRADE	Sq. Ft. Allow. Per Person	Fiscal Year Ending June 30, 1966		Current Fiscal Year 1967		Budget Fiscal Year 1968		As of End of Budget Fiscal Year '68	
		Number of Authorized Positions	Number of Sq. Ft. Allowed	Authorized Employee Increases	Number of Additional Sq. Ft. Required	Anticipated Employee Increases	Number of Additional Sq. Ft. Required	Total Employees (Cols. 2+4+6)	Total Sq. Ft. (Cols. 3+5+7)
GS 1-6	100	4	400	21	2100	3	300	28	2800
GS 7-11 Supervisory	100					4	400	4	400
GS 7-11 Nonsupervisory	100	5	500	4	400	2	200	11	1100
GS 12-13 Supervisory	150	3	450	4	600			7	1050
GS 12-13 Nonsupervisory	100								
GS 14-15 Supervisory	250	3	750	1	250			4	1000
GS 14-15 Nonsupervisory	150								
GS 16, 17, 18	300								
*TOTALS		15	2100	30	3350	9	900	54	6350

*Plus 2 Engrs. (GS 13 & 11) and 1 Steno. (GS 4) on TITLE III Reports covering areas outside of Mo. Basin.